HE
18.5
.A37
no.
DOT-
TSC-
UMTA-
85-17

UMTA-MA-06-0049-85-1

U.S. Department
of Transportation

**Urban Mass
Transportation
Administration**

National Ridesharing Demonstration Program: Comparative Evaluation Report

UMTA/TSC Evaluation Series

Final Report
August 1985

DEPARTMENT OF
TRANSPORTATION
NOV 22 1985
LIBRARY

UMTA Technical Assistance Program

NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

NOTICE

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

HE
18.5
.A37
no.
DOT-
TSC-
UMTA-
85-17

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTA-MA-06-0049-85-1		

4. Title and Subtitle	5. Report Date
NATIONAL RIDESHARING DEMONSTRATION PROGRAM: COMPARATIVE EVALUATION REPORT	August 1985
	6. Performing Organization Code: DTS-64
7. Author(s): Rosemary Booth and Robert Waksman	8. Performing Organization Report No.: DOT-TSC-UMTA-85-17
9. Performing Organization Name and Address: U.S. Department of Transportation, Research and Special Programs Administration, Transportation Systems Center, Cambridge, MA 02142	10. Work Unit No. (TRAIS): UM527/R5631
	11. Contract or Grant No.
12. Sponsoring Agency Name and Address: U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Technical Assistance, Washington, D.C. 20590	13. Type of Report and Period Covered: Final Report, January 1979-December 1981
	14. Sponsoring Agency Code: URT-30

DEPARTMENT OF TRANSPORTATION
NOV 25 1985
LIBRARY

15. Supplementary Notes

16. Abstract

The report evaluates 17 projects of the National Ridesharing Demonstration Program, with detailed analysis of five sites where a workplace survey was conducted--Atlanta, Cincinnati, Houston, Portland, and Seattle. Among the topics covered are project background, description, implementation, obstacles to project development, the market for ridesharing, the impact of ridesharing programs, and the effectiveness of promotional techniques.

Evaluators found that the primary market for ridesharing appears to be multi-worker households with one car, living relatively far from the work site. Most commuter carpools were found to consist of informal arrangements between household members or fellow workers. The proportion of employees ridesharing and carpool size were found to increase with firm size. No relationship was found between "flextime" and ridesharing. The need to pay for parking at work was seen to have a low impact on rideshare mode split, but the impact varied with transit service quality. Although area ridesharing programs contacted a high proportion of firms, the share of employees actually receiving program materials was found to be much lower. The impact of area ridesharing programs on commuter travel behavior could not be conclusively determined from NRDP data, but the direct impact seemed to be small. Neighborhood-based ridesharing promotion did not appear to be an effective alternative to employer marketing programs.

17. Key Words	18. Distribution Statement
Ridesharing, Carpool, Vanpool, Commuting, Flextime	Document is available to the public through the National Technical Information Service, Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	188	

PREFACE

This report is part of the TSC Evaluation series for the UMTA Service and Methods Demonstration Program, U.S. Department of Transportation. It was written by Rosemary Booth, Transportation Systems Center (TSC) Project Manager for the National Ridesharing Demonstration Program cross-cutting evaluation, and Robert Waksman, also of TSC.

The report evaluates 17 projects of the National Ridesharing Demonstration Program, with detailed analysis of five sites where a workplace survey was conducted--Atlanta, Cincinnati, Houston, Portland, and Seattle. The purpose of this cross-cutting evaluation is twofold: to document the results of the NRDP projects, and to provide technical guidance for ridesharing program efforts.

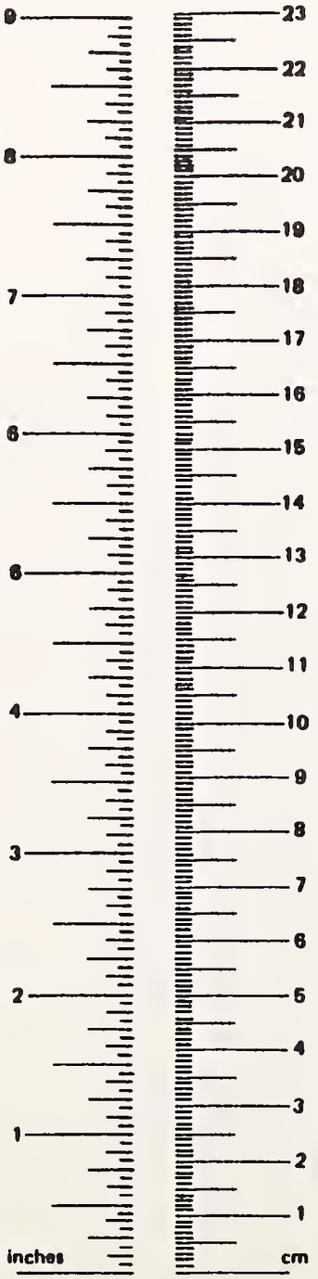
Numerous persons offered guidance, information, and critical comments which were most helpful in preparation and revision of the study, including James Bautz, Director of the Urban Mass Transportation Administration's Office of Management Research and Transit Services; George Schoener and Robert Redmond of the Urban Planning and Transportation Management Division of the Federal Highway Administration (FHWA); Nancy Ebersole and Carl Rappaport of the Office of the Secretary of Transportation; Michael Jacobs, Bruce Spear, Lawrence Doxsey, Joel Freilich, and Eric Schreffler of TSC, and Carla Heaton and Constance Perin, formerly of TSC; Philip Salopek of the U.S. Census Bureau's Journey-to-Work Statistics Program; and Jeffrey Hamm, with Seattle Metro. Their assistance is gratefully acknowledged.

METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	querts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in. = 2.54 cm (exactly). For other exact conversions and more detail tables see NBS Misc. Publ. 286, Units of Weight and Measures. Price $2.25 SD Catalog No. C13 10 286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	querts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	36	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

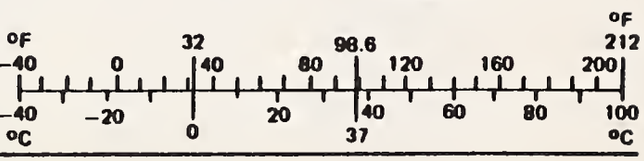


TABLE OF CONTENTS

		Page
1.	INTRODUCTION	1
	1.1 Ridesharing as a Transportation Mode	1
	1.1.1 Working Definition	1
	1.1.2 Evolution and Status	2
	1.2 The National Ridesharing Demonstration Program	6
	1.2.1 Development and Purpose of the NRDP	6
	1.2.2 Overview of Program Evaluation	8
	1.2.3 Measurement of Ridesharing Participation	12
2.	DEMONSTRATION PROJECT CHARACTERISTICS	19
	2.1 Demonstration Sites	19
	2.2 Time Frame and Budgets	21
	2.3 Project Administration	23
	2.4 Structure of the Demonstration Projects	26
	2.4.1 Individual Project Goals	27
	2.4.2 Demonstration Elements	29
3.	PROJECT IMPLEMENTATION AND OPERATION	33
	3.1 Practical Barriers to Project Startup	33
	3.2 Overcoming Institutional Barriers	37
	3.3 Factors Associated with Successful Implementation	38
	3.3.1 Project Design	39
	3.3.2 Organization and Coordination	40
4.	RIDESHARING ARRANGEMENTS AND PARTICIPANTS	43
	4.1 Employee Ridesharing	43
	4.1.1 The Ridesharing Commute Mode Choice	43
	4.1.2 Factors Associated with Ridesharing	44
	4.1.3 Carpool Arrangements	63
	4.2 Employer Involvement in Employee Ridesharing	75
	4.2.1 Characteristics of Surveyed Firms	75
	4.2.2 Transportation Assistance	78
5.	EFFECTIVENESS OF THE DEMONSTRATION PROJECTS	91
	5.1 Estimating the Impact of the Demonstrations	91
	5.2 Ridesharing Program Marketing to Employers	92
	5.2.1 Marketing Contact with Firms	93
	5.2.2 Impact on Mode Choice	97
	5.3 Effectiveness of Other Project Strategies	107
	5.3.1 Neighborhood and Regional Marketing	107
	5.3.2 Institutional and Environmental Changes	109
	5.3.3 Development of New Services	110
	5.3.4 Other Employment-Based Techniques	111

TABLE OF CONTENTS (cont.)

6. CONCLUSIONS.....113

6.1 Recurrent Ridesharing Issues.....113
6.1.1 Ridesharer Characteristics.....113
6.1.2 Carpool Arrangements.....114
6.1.3 Firm Involvement.....115
6.1.4 Program Effect on Mode Split.....116
6.2 Research Recommendations.....117

APPENDIX A: PROFILES OF 17 NRDP PROJECTS.....A-1

APPENDIX B: SAMPLE EMPLOYER AND EMPLOYEE QUESTIONNAIRES.B-1

APPENDIX C: DATA ANALYSIS AND WEIGHTING METHODOLOGY.....C-1

REFERENCES.....R-1

BIBLIOGRAPHY.....Bibl.-1

LIST OF ILLUSTRATIONS

Figure

1-1. 17 EVALUATED NRDP DEMONSTRATION SITES..... 7

1-2. DATABASE DEVELOPMENT PROCESS FOR NRDP EMPLOYER SURVEY.. 14

4-1. 1982 EMPLOYEE RIDESHARE MODE SPLIT BY FIRM SIZE CATEGORY..... 52

4-2. CUMULATIVE DISTRIBUTION OF CARPOOLERS BY CARPOOL SIZE.. 64

4-3. MOVEMENT INTO AND OUT OF MODES: FIVE-SITE AVERAGE..... 74

4-4. MOVEMENT INTO AND OUT OF MODES BY SITE..... 76

4-5. SMALL AND LARGE FIRM SHARE OF ALL AREA FIRMS AND ALL AREA EMPLOYEES..... 79

5-1. PERCENTAGE OF ALL AREA EMPLOYEES IN FIRMS HAVING CONTACT WITH RIDESHARING PROGRAM..... 95

LIST OF TABLES

Table

1-1. MODE SPLIT FOR TRAVEL TO WORK IN THE UNITED STATES..... 4

1-2. LEVELS OF EFFORT FOR NRDP PROJECT EVALUATIONS..... 9

1-3. WORKPLACE SURVEY SAMPLE SIZES..... 13

2-1. NUMBER OF EMPLOYERS BY FIRM SIZE CATEGORY AND NUMBER OF EMPLOYEES..... 20

2-2. NRDP GRANTS FOR 17 EVALUATED PROJECTS..... 22

2-3. AGENCIES ADMINISTERING THE 17 EVALUATED NRDP PROJECTS.. 24

2-4. DEMONSTRATION ELEMENTS OF NRDP PROJECTS IMPLEMENTED AND EVALUATED..... 30

4-1. 1980 and 1982 COMMUTE MODE SPLIT..... 45

4-2. 1982 RIDESHARE MODE CHOICE BY SEX OF RESPONDENT..... 47

4-3. AGE DISTRIBUTION OF RIDESHARING EMPLOYEES AND ALL EMPLOYEES..... 48

4-4. DISTRIBUTION OF ATUOS PER EMPLOYED HOUSEHOLD MEMBER FOR RIDESHARING EMPLOYEES AND ALL EMPLOYEES..... 49

4-5. DISTRIBUTION OF FIVE MOST FREQUENTLY OCCURRING PRIMARY MOTIVES FOR MODE CHOICE AMONG RIDESHARING EMPLOYEES AND ALL EMPLOYEES..... 51

4-6. AVERAGE EMPLOYEE COMMUTE DISTANCE BY 1982 COMMUTE MODE. 54

4-7. 1982 EMPLOYEE RIDESHARE MODE SPLIT BY TYPE OF WORK SCHEDULE..... 55

4-8. DISTRIBUTION OF CARPOOL FORMATION PATTERNS AMONG CARPOOLERS WITH DIFFERENT TYPES OF WORK SCHEDULES..... 57

4-9. 1982 EMPLOYEE RIDESHARE MODE SPLIT BY AVAILABILITY OF FREE PARKING AT THE WORK SITE..... 60

4-10. 1982 COMMUTE MODE SPLIT BY AVAILABILITY OF FREE PARKING AT THE WORK SITE..... 62

4-11. DISTRIBUTION OF CARPOOLERS BY FREQUENCY OF SERVICE AS DRIVER AND SEX OF RESPONDENT..... 65

LIST OF TABLES (cont.)

4-12. DISTRIBUTION OF NUMBER OF OTHER CARPOOL MEMBERS FROM THE SAME HOUSEHOLD BY CARPOOL SIZE..... 66

4-13. DISTRIBUTION OF NUMBER OF OTHER CARPOOL MEMBERS WORKING FOR SAME EMPLOYER BY CARPOOL SIZE..... 69

4-14. DISTRIBUTION OF CARPOOLERS BY METHOD OF CARPOOL FORMATION FOR SELECTED-SIZE CAR- OR VANPOOLS..... 71

4-15. DISTRIBUTION OF FIRMS BY TYPE OF BUSINESS..... 80

4-16. DISTRIBUTION OF EMPLOYEES BY TYPE OF WORK SCHEDULE..... 81

4-17. DISTRIBUTION OF FIRMS BY PROVISION AND/OR AVAILABILITY OF FREE PARKING WITHIN .25 MILES OF WORK SITE..... 82

4-18. DISTRIBUTION OF FIRMS BY PROVISION OF TRANSPORTATION ASSISTANCE..... 84

4-19. PROPORTION OF EMPLOYERS STATING THAT BENEFITS OF EMPLOYER-PROVIDED RIDESHARING ASSISTANCE OUTWEIGH COSTS BY WHETHER EMPLOYER PROVIDES SUCH ASSISTANCE..... 85

4-20. PROPORTION OF LARGER AND SMALLER FIRMS OFFERING RIDESHARING ASSISTANCE..... 86

4-21. EMPLOYEE RIDESHARE MODE SPLIT AT FIRMS OFFERING VARIOUS TYPES OF TRANSPORTATION ASSISTANCE..... 87

4-22. EMPLOYEE RIDESHARE MODE SPLIT AT FIRMS OFFERING VARIOUS TYPES OF ASSISTANCE BY FIRM SIZE CATEGORY..... 89

5-1. PROPORTION OF LARGER AND SMALLER FIRMS HAVING CONTACT WITH RIDESHARING PROGRAM..... 94

5-2. PERCENT OF EMPLOYEES RECEIVING RIDESHARING MATERIALS OR ASSISTANCE FROM AREA RIDESHARING PROGRAM BY WHETHER EMPLOYER RECEIVED SUCH ASSISTANCE..... 96

5-3. DISTRIBUTION OF EMPLOYEES RECEIVING RIDESHARING PROGRAM MATERIALS OR ASSISTANCE BY WHETHER EMPLOYER RECEIVED SUCH ASSISTANCE..... 98

5-4. EMPLOYEE RIDESHARE MODE SPLIT BY FIRM CONTACT WITH RIDESHARING PROGRAM..... 99

5-5. PERCENT OF CONTACTED AND NON-CONTACTED LARGER FIRMS OFFERING RIDESHARING ASSISTANCE.....100

LIST OF TABLES (cont.)

5-6. EMPLOYEE RIDESHARE MODE SPLIT BY FIRM CONTACT WITH RIDESHARE PROGRAM AT FIRMS WHICH DO AND DO NOT OFFER RIDESHARING ASSISTANCE.....102

5-7. DISTRIBUTION OF ALL AREA EMPLOYEES BY USE OF ASSISTANCE RECEIVED FROM RIDESHARING PROGRAM.....104

5-8. PROPORTION OF CURRENT CARPOOLERS DIRECTLY HELPED BY RIDESHARING PROGRAM AT ALL FIRMS AND NON-CONTACTED FIRMS.....105

5-9. DISTRIBUTION OF CARPOOLERS ASSISTED BY THE RIDESHARE PROGRAM BY WHETHER THE CARPOOLS THEY WERE HELPED TO JOIN WERE PRE-EXISTING OR NEW.....106

LIST OF ABBREVIATIONS

CBD	central business district
DOE	(U.S.) Department of Energy
DOT	(U.S.) Department of Transportation
FAUS	Federal Aid - Urban Systems
FHWA	Federal Highway Administration
HOV	high-occupancy vehicles
NRDP	National Ridesharing Demonstration Program
OST	Office of the Secretary of Transportation
SMD	Service and Methods Demonstration (Program)
TSC	Transportation Systems Center
UMTA	Urban Mass Transportation Administration

EXECUTIVE SUMMARY

The Department of Transportation (DOT) established the National Ridesharing Demonstration Program (NRDP) in 1979 as part of its continuing efforts to promote energy conservation and improve transportation system management. The objectives of this two-year program were to develop comprehensive and innovative approaches to ridesharing and to assess the effect of demonstration projects at 17 funded sites. The program was jointly sponsored by the Federal Highway Administration (FHWA), the Urban Mass Transportation Administration (UMTA) and the Office of the Secretary of Transportation (OST), with FHWA taking the lead administrative role. The Transportation Systems Center (TSC), a research and development organization within DOT, was responsible for the NRDP evaluation.

The purpose of this cross-cutting evaluation is twofold: to document the results of the NRDP projects, and to provide technical guidance for ridesharing program efforts. The evaluation first defines the demonstration background and then describes the projects and how they were implemented. Subsequent sections focus on a number of issues, including obstacles to project development, the market for ridesharing among firms and individuals, and the impact of publicly sponsored ridesharing programs as well as the effectiveness of various ridesharing promotional techniques. The report is based on evidence contained in individual project evaluation reports as well as on results of a workplace survey administered by the grantees to a total of over 800 firms and more than 11,000 employees at five demonstration sites.

Major quantitative findings are based on analysis of survey results at these five sites. Principal findings of the entire research effort are as follows:

- Project design and implementation--Careful design and adequate funding appear essential for satisfactory program implementation.

  Only half of the grantees were able to implement and complete their proposed projects within the demonstration period. Among the reasons given for delays were inadequate management resources within the administrative agency, funding difficulties, and federal procedures and requirements. Factors associated with successful implementation of a ridesharing demonstration included project design, organization, and coordination. Limited, well-defined projects also produced more useful research results.

- Primary ridesharing market--The primary market for commuter ridesharing appears to be multi-worker households with at least one car, located relatively long distances from their workplaces.

  Commuter ridesharing was found to be more likely among persons living relatively long distances from work whose households owned at least one car but included more than one employed worker. Women were more likely to rideshare than men, particularly as passengers, but no relationship was found between age or income and propensity to rideshare. Low cost emerged as the most important reason why commuters rideshare, but ridesharers were also concerned about convenience and travel time.

- Carpool formation and composition--Most commuter carpools seem to consist of informal arrangements between two household members or fellow workers.

  More than 80 percent of commuter carpools were formed within households or by informal work contact. Approximately one third of commuter carpools consisted of two persons from the same household commuting together. Larger carpools had a higher proportion of fellow workers and a lower proportion of household members than did smaller carpools. Nearly half of the ridesharing commuters reverted to other modes over a two-year time period, and conversely slightly less than half of present ridesharers were using a different mode two years ago. Most carpooler movement was into and out of the drive alone mode.

- Employer involvement with ridesharing--The proportion of employees ridesharing and carpool size appear to increase with firm size.

  Firm size was found to be positively correlated with the ridesharing mode split and with carpool sizes. Large firms were also more apt to offer ridesharing and other transportation assistance to their employees. While there was a correlation between firm ridesharing assistance and the percent of employees who rideshare, it was not clear how such assistance affects employee decisions to carpool.

- Impact of flextime--No relationship was found between a "flextime" work schedule and employee tendency to rideshare.

  There were no significant differences in rideshare mode split between those on fixed schedules and those with flexible schedules. Evidence suggested that flextime may well enhance the ability of persons living together but working at different firms to form carpools but may inhibit the formation of worker-formed carpools, thus producing little net effect.

- Impact of employee-paid parking fees--The need to pay for parking at the work site had a low impact on rideshare mode split, an impact which varied with transit service quality.

  Parking fees substantially increase the cost of driving alone and, to a lesser extent, the cost of ridesharing. Such fees at the work site were found to have little impact on the rideshare mode split in cities with good transit service, where the number of solo drivers switching to ridesharing appeared to be offset by the number of ridesharers deciding to take transit. In cities with poor transit service, parking fees moderately increased the proportion of commuters ridesharing, as solo drivers apparently switched to that mode and ridesharers had no good transit alternative.

- Ridesharing program reach--Although area ridesharing programs contacted a high proportion of firms, the share of employees actually receiving program materials appeared to be much lower.

  Ridesharing programs contacted work sites employing about half of the employees in a region, on average, including contacts made before the demonstration period. At the same time, fewer than one third of these employees reported receiving program materials. Fewer than 20 percent of all area employees actually received such materials.

- Ridesharing program impact--The impact of ridesharing programs on commuter travel behavior cannot be conclusively determined from NRDP data, but the direct impact appears to be small.

  Between two and five percent of current carpoolers directly credited the ridesharing program with helping them to rideshare. The indirect impact of ridesharing programs on employee commute behavior may be considerable but could not be measured. For example, many area ridesharing programs consciously strove to transfer responsibility for ridesharing assistance efforts to employers, which would probably have made workers less likely to attribute assistance to the programs. Employees of firms in contact with the ridesharing program and offering ridesharing assistance were more inclined to rideshare than employees of other firms, but it was not possible to say definitively whether firm contact with a local ridesharing program in itself increased ridesharing.

- Other ridesharing strategies--Neighborhood-based ridesharing promotion does not appear to be an effective alternative to employer marketing programs, but several other strategies may be useful.

  Neighborhood-based or home-end ridesharing promotion did not seem to increase ridesharing, based on experiences at two sites. Regional ridesharing promotion, however, appeared to be an effective tool for increasing public awareness of ridesharing. Shared-ride service in small vehicles looked like a promising alternative to conventional service in certain low- or medium-density markets in terms of total cost and market acceptability, based on experience at one site. The use of interactive computer facilities for processing rideshare matching applications apparently increased matching at one site but its cost-effectiveness was not demonstrated.

The above findings address issues of how ridesharing works and what techniques seem promising for improving ridesharing participation, but do not answer more fundamental questions: What are the benefits versus the costs of ridesharing? How are they measured? Do the benefits of ridesharing so far outweigh the costs that ridesharing should always be encouraged over alternative means of travel? The National Ridesharing Demonstration Program did not provide sufficient information to make a conclusive assessment of these issues, but the data available do suggest that the ratio of benefits to costs may vary considerably from site to site and among various ridesharing activities. Further research outlining the criteria for assessing ridesharing benefits and costs in different contexts in order to make decisions about ridesharing programs and policy would seem useful.

1. INTRODUCTION

1.1 RIDESHARING AS A TRANSPORTATION MODE

1.1.1 Working Definition

Defining the term "ridesharing" has been somewhat arbitrary, beyond the obvious reference to transportation involving more than one person. As ridesharing has evolved, it has been variously understood. Among the criteria commonly used to distinguish ridesharing from other modes are vehicle type, destination, route type, driver purpose, and method of financing. Proposed definitions range from carpooling only to all transportation of more than one person, with the exception of public transit, or all high-occupancy vehicle (HOV) modes except those operating on fixed routes. Because ridesharing can be defined in many ways, it is useful to determine at the outset the minimum conditions for a ridesharing situation: these include transportation of more than one person, usually in a privately owned or leased vehicle.

Ridesharing can refer to all trips, but more often refers to commuting trips. For the purposes of this report, "ridesharing" usually denotes motor vehicle travel in which the driver is accompanied by at least one passenger, the driving function is uncompensated or compensated in only nominal fashion and the vehicle is owned or leased by an individual for his personal use or by an institution for the use of its employees (1: p. 4)*

---

*Notes are located in References section at end of report.

It thus includes buspooling, for example, but excludes the use of taxicabs and modes that are commonly known as public transit. Two exceptions to the definition which appear in this report are one project which involved use of shared-ride taxi and jitney service and another which focused on non-work ridesharing in neighborhoods. Carpooling and vanpooling are the major forms of ridesharing considered, and the terms "carpooling" and "vanpooling" are used throughout the document to mean ridesharing in cars or vans.

1.1.2 Evolution and Status

Ridesharing has been around as long as wheeled vehicles, but in the specialized sense referred to above it has evolved in tandem with the gasoline-powered automobile. Significant surges of interest in ridesharing in the United States have, not surprisingly, been related to critical shortages of petroleum products, and the resulting perception of a "national need" for energy conservation (2). This interest is reflected in the proliferation of commuter ridesharing programs nationwide during the 1940s and again during the 1970s.

The shortage of petroleum was pronounced during World War II, and rationing was imposed. Ridesharing efforts at private firms were undertaken as part of the "war effort," with government endorsement and promotion but without federal financing of ridesharing operations. Carpool matching systems were started at firms such as the Briggs Manufacturing Company, using a grid mechanism and employee meetings to pair riders and drivers (2: p. 62).

Two more recent fuel crises in 1973-74 and 1978-79 drove up the price of (and waiting time for) gasoline, and led to widespread fear of long-term shortages. Cost and energy conservation considerations motivated firms, the federal government, and individuals to organize more efficient transportation to work. Many of the national ridesharing programs receiving NRDP funds were initiated as a result of the 1973-74 fuel crisis, although few programs became active during the shortage itself (3: p. 15) The energy crises of the 1970s also saw the start of numerous corporate vanpooling services, such as the program begun at the Minnesota Mining and Manufacturing (3M) Company in 1973. Since then, private ridesharing van services have taken on a life of their own. The number of vanpools has grown from fewer than 1,000 in 1973 to an estimated 20,000 at present (4: p. 1)

The proliferation of employer vanpools has been assisted not only by an awareness of the need for energy conservation but also by new residential and firm locational decisions. As the number of jobs has declined in the urban centers of the Northeast, population and the demand for transportation have shifted from those areas to the urban centers of the West and South, and to all suburban areas, a trend described by Fulton (5: p. 18). At the same time, the supply of public transit has not yet materially shifted, but remains anchored in the older urban centers. The result is an overall decline in the use of public transit over the decade 1970-1980 and an increase in the use of automobiles, including a very small increase in shared-use automobile and vanpool. Table 1-1 compares the 1970, 1975 and 1980 mode splits for travel to work.

Table 1-1.

MODE SPLIT FOR TRAVEL TO WORK IN THE UNITED STATES
(%)

	All Auto	Shared-Ride Auto	Single-Person Auto	Public Transit
1980	84.1	19.7	64.4	6.4
1975	84.7	19.4	65.3	6.0
1970	77.7	NA	NA	9.0

Source: P. Fulton, "Are we Solving the Commuting Problem?" American Demographics (November 1983), based on 1980 Census Summary Tape File 3; U.S. Bureau of the Census, Current Population Reports P-23, #99; Journey to Work in the U.S.: 1975 (July 1979); and U.S. Bureau of the Census, Census of Population: 1970; Volume I, "Characteristics of the Population," Part I, U.S. Summary, Section 1 (1971).

Unfortunately, census data describing the journey-to-work mode split before 1975 are not comparable with those from 1975 to the present, because the categories for means of transportation to work are differently defined. The 1970 census, for example, asked whether respondents were private auto drivers or passengers. Since drivers of carpools versus drivers of single-occupancy autos were not distinguished, the question establishes a floor for the number of carpoolers, but does not indicate the actual number carpooling. While it is possible to trace a decline in the use of public transit, and a growth in the use of private automobile, it is not possible to compare the amount of shared-ride versus single-occupancy auto use prior to 1975.*

Over the past decade, a systematic public effort has evolved in support of organized shared-ride transportation. FHWA involvement in ridesharing actually antedates the gasoline crisis, in that the agency acted as a clearinghouse for ridesharing information beginning in the mid-1960s (3). Extensive government involvement in ridesharing followed the 1974 Emergency Highway Energy Conservation Act, which allowed the funding of 90 percent of the cost of state, regional and local ridesharing activities with Federal Aid-Urban Systems (FAUS) funds. The Act was itself a response to concern over energy shortfalls and the need for fuel conservation. Short summaries of this process can be found in Fleishman, Shallbetter and Wagner (6, 7, 3: p. 9).

---

*Author's conversation with Philip Salopek, Journey-to-Work Statistics Program, U.S. Bureau of the Census, March 1984.

The programs were developed under the direction of the Federal Highway Administration (FHWA) and stressed efficient use of highway facilities. The Department of Energy (DOE) has taken an active interest in ridesharing, and has funded ridesharing projects as well as published information about ridesharing. Between 1975 and 1977 the Urban Mass Transportation Administration (UMTA) sponsored ridesharing (third-party vanpooling) demonstration projects in Knoxville, TN; San Francisco, CA (Golden Gate); Minneapolis/St. Paul, MN; and Norfolk, VA. Section 126 of the Surface Transportation Assistance Act of 1978 provided a permanent funding source for ridesharing programs. The report of a 1979 presidential task force on ridesharing stressed elimination of barriers to ridesharing and development of incentives to promote ridesharing as a transportation mode (8).

1.2 THE NATIONAL RIDESHARING DEMONSTRATION PROGRAM

1.2.1 Development and Purpose of the NRDP

Energy conservation was the initial impetus for Federal ridesharing involvement and, along with transportation system management, continues to be a major focus of Department of Transportation (DOT) efforts to promote carpooling and vanpooling arrangements. The National Ridesharing Demonstration Program (NRDP) was established by DOT in 1979 through its authority to use funds available to the Department and its modal agencies. The objective of this two-year program was to develop comprehensive and innovative approaches to ridesharing and to assess the effect of demonstrations projects at 17 sites, shown in Figure 1-1. The program was

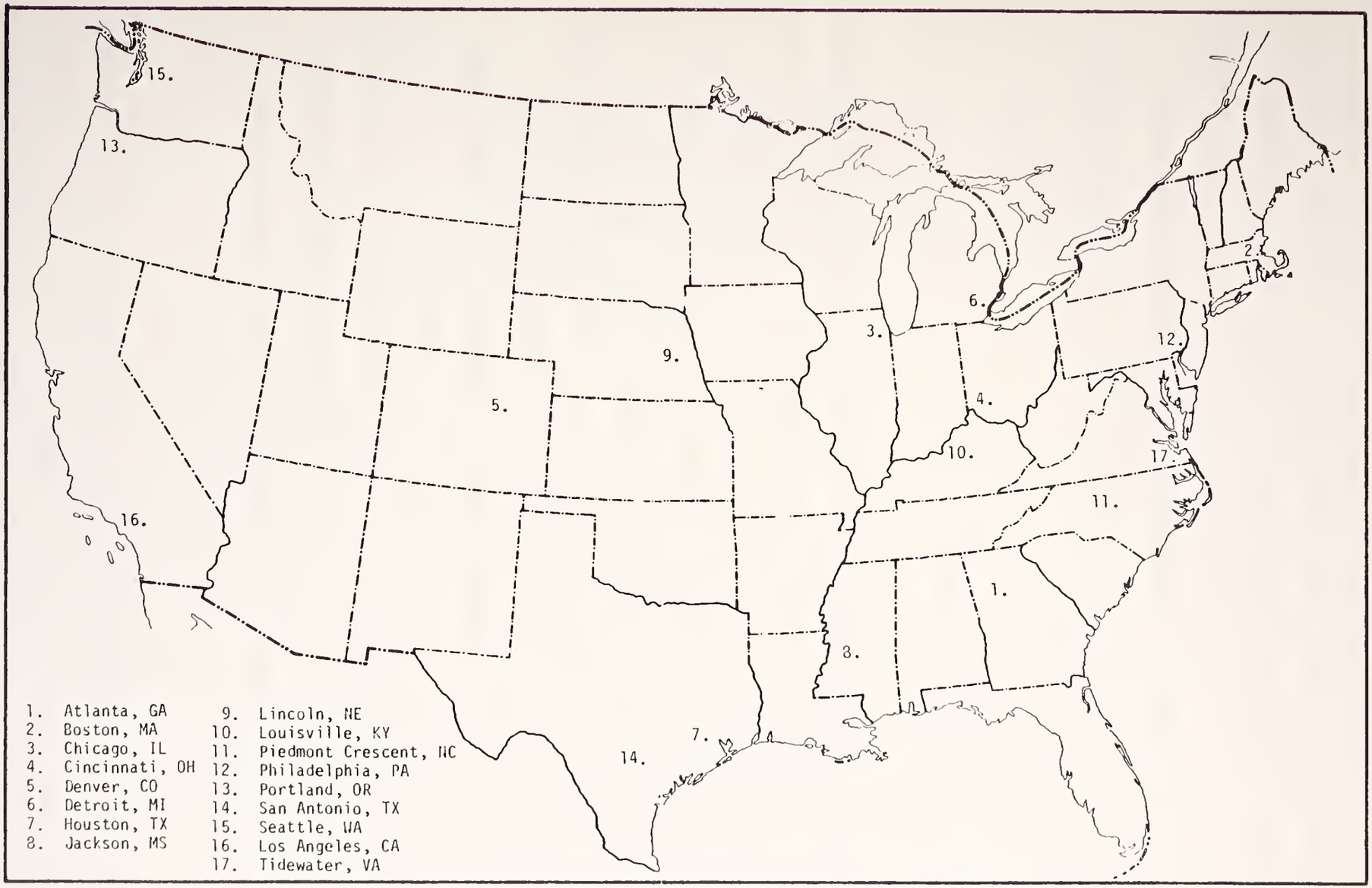


Figure 1-1.
17 EVALUATED NRDP DEMONSTRATION SITES

jointly sponsored by the FHWA, UMTA, and the Office of the Secretary of Transportation (OST). FHWA had the lead responsibility for the program, but shared management of the individual projects with UMTA. Although the cross-cutting report focuses on the first group of 17 projects to be funded and evaluated, the FHWA is itself funding and evaluating 65 ridesharing demonstrations awarded between late 1979 and 1982, and continues to support an extensive ridesharing program.

1.2.2 Overview of Program Evaluation

The purpose of this comparative evaluation is to describe the ridesharing demonstration projects and how they were implemented, including the obstacles to project development; to assess the market for ridesharing by examining individual and firm participation in ridesharing programs; and to analyze the impact of publicly sponsored ridesharing programs as well as the effectiveness of various ridesharing promotional activities. The Transportation Systems Center (TSC), a research and development organization within DOT, was responsible for the NRDP evaluation, which consisted of the planning and technical direction of individual demonstration evaluations, and comparative cross-cutting analysis of the entire program. Data collection was performed by the grantees in accordance with an evaluation plan prepared by TSC and adapted in consultation with the grantees to meet the needs of individual projects (1: p. 6).

Three levels of effort were applied to demonstration project evaluation, as shown in Table 1-2. Five projects which conducted a uniform workplace survey were evaluated as case studies incorporating quantitative analysis of

Table 1-2.

LEVELS OF EFFORT FOR NRDP PROJECT EVALUATIONS

1. Case studies with workplace survey data

   Atlanta, GA
   Cincinnati, OH
   Houston, TX
   Portland, OR
   Seattle, WA

2. Case studies

   Lincoln, NE
   North Carolina
   Southern California*
   Tidewater, VA

3. Summary memos

   Boston, MA
   Chicago, IL
   Denver, CO
   Detroit, MI
   Jackson, MS
   Louisville, KY
   Philadelphia, PA
   San Antonio, TX

*Evaluated by the grantee.

results from this survey, as well as data gathered specifically for individual sites. Four projects whose data collection was limited to site-specific information were evaluated as simple case studies using that information. Because the remaining eight projects did not begin operation during the demonstration period, they have been evaluated in summary memos which primarily document the implementation process and associated difficulties at those sites. For ease of reference, demonstrations are categorized and referred to by the level of their evaluation (i.e., case study with workplace survey, case study, summary memo) throughout this report.

Demonstrations in Atlanta, GA; Cincinnati, OH; Houston, TX; Portland, OR; and Seattle, WA were evaluated with case studies using workplace survey data. Ridesharing demonstration projects at these five sites included an extensive survey of sampled firms and their employees, which was conducted by the grantees with technical assistance from TSC and its evaluation contractors. The reports at these sites incorporated analysis of data from the survey as well as data collection efforts which were specific to the sites. All five sites undertook major ridesharing demonstration projects, although many of these programs represented expansions or extensions of existing ridesharing activities rather than introduction of completely new ones. The most common demonstration element across the five sites was employer-based marketing. In general, this meant promotion by the local ridesharing program of carpooling and vanpooling efforts at firms in the vicinity. Promotional techniques ranged from simple briefings or information sessions for employers and employees to assistance with carpool matching and training of on-site transportation coordinators.

Case study evaluations were undertaken in Lincoln, NE; the Piedmont Crescent region of North Carolina; Southern California; and the Tidewater region of Virginia. The studies were limited to analysis of data collected by the individual projects and qualitative evidence of project development and effectiveness. In all but one case (Southern California), the case studies document distinctive or unusual ridesharing projects, from community-based (Lincoln, NE) and regional (North Carolina) marketing efforts to a shared-ride taxi demonstration (Tidewater, VA). The Southern California project emphasized the use of transportation coordinators at firms to conduct rideshare matching and assist in the development of transportation programs.

Demonstrations in Boston, MA; Chicago, IL; Denver, CO; Detroit, MI; Jackson, MS; Louisville, KY; Philadelphia, PA; and San Antonio, TX were documented with summary memos. All of the sites in this category experienced substantial difficulties in project implementation or development. Because the NRDP evaluation budget was limited, it was decided to terminate the evaluations at these sites and to use remaining resources to examine the startup difficulties encountered. Summary memos were written which document the process of project startup and describe the institutional issues which prevented full development of project plans.

The first part of Chapter 2 and all of Chapter 3 of this report are based on information from all 17 case studies and summary memos. These sections describe the projects and how they began operation. Analysis of the implementation problems which affected some demonstrations is based on the summary memos only. Chapter 4, which describes the employee and employer ridesharing markets, relies mainly on information obtained from the five case

study sites at which workplace surveys were administered. Chapter 5, which examines what the demonstration projects achieved, is based on survey data, evaluation reports, and supplementary information obtained from the FHWA, individual evaluation contractors, or grantees. Brief profiles giving basic descriptive information as well as short listings of project goals, elements, data collection, and findings for all 17 projects can be found in Appendix A.

1.2.3 Measurement of Ridesharing Participation

A workplace survey, developed by TSC and conducted by grantees at five sites, provides quantitative evidence of individual and firm participation in ridesharing and ridesharing programs. The survey had two parts: one administered to a random sample of employers, stratified by firm size, and one administered to all or a sample of employees at the same firms, depending on firm size. The employer and employee survey forms are included in Appendix B. While minor adaptations of survey terminology were made to accommodate different site conditions, all of the surveys were essentially the same as the samples. Over 800 firms and more than 11,000 employees in five urban areas responded to the survey, as shown in Table 1-3.

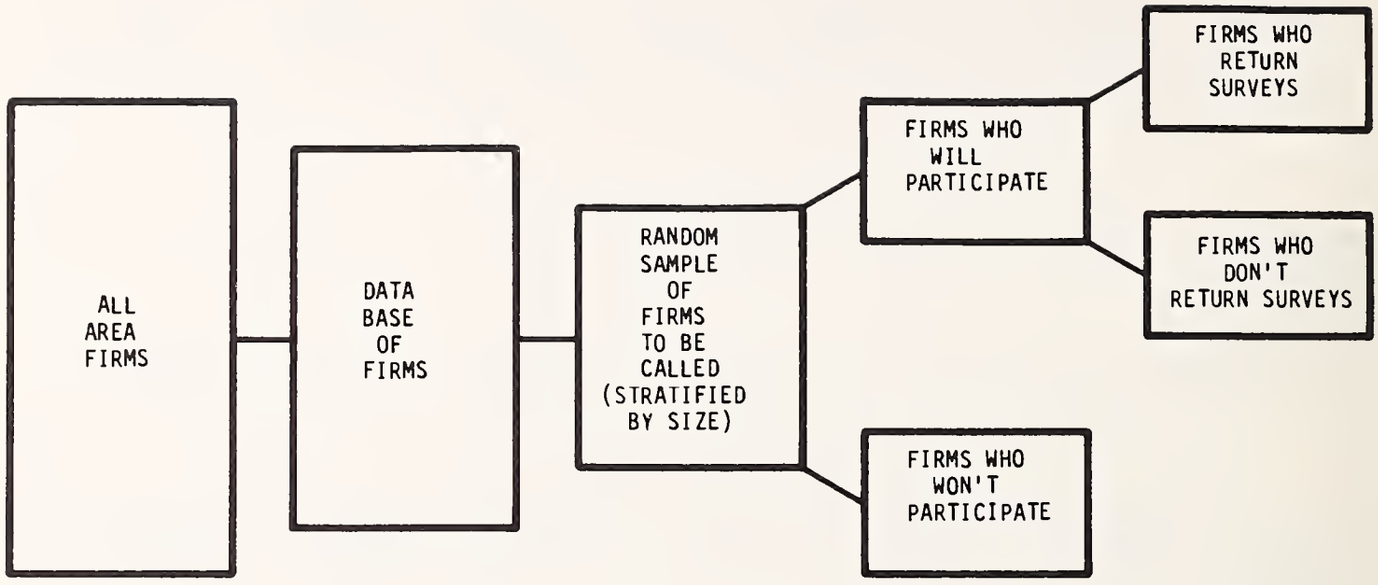
The employer survey was administered to over 100 employers in each of the five site locations, or to a total of more than 800 firms. The firms were randomly selected from a list of all firms within each of four size categories. A diagram of the process by which the employer survey database was developed is given in Figure 1-2. Survey questions fell into four categories: organizational characteristics, parking arrangements, activities related to employee commuting, and management attitudes toward

Table 1-3.

WORKPLACE SURVEY SAMPLE SIZES

	Atlanta	Cincinnati	Houston	Portland	Seattle	TOTAL
Usable* employer surveys	254	171	105	142	195	867
(not usable)	4	19	25	30	31	109
Usable* employee surveys	3,578	2,403	2,237	2,776	2,847	11,624
(not usable)	251	316	718	476	406	2167

*Some employer surveys were not usable because respondents failed to fill out firm size information, which was needed to weight responses. Some employee surveys were not usable, either because a respondent's employer failed to fill out an employer survey form or because the employer failed to fill out firm size information.


ALL AREA FIRMS
DATA BASE OF FIRMS
RANDOM SAMPLE OF FIRMS TO BE CALLED (STRATIFIED BY SIZE)
FIRMS WHO WILL PARTICIPATE
FIRMS WHO WON'T PARTICIPATE
FIRMS WHO RETURN SURVEYS
FIRMS WHO DON'T RETURN SURVEYS

Source: Synthesized from individual case study reports and additional technical information from evaluation contractors for the case study sites.

Figure 1-2.

DATABASE DEVELOPMENT PROCESS FOR NRDP EMPLOYER SURVEY

employer-sponsored ridesharing programs. Organizational questions focused on a firm's locational characteristics and also on the size and characteristics of its work force. A second set of questions focused on parking availability and cost (both to firms and employees). Firm involvement in employee commuting was explored in some detail, including reasons for and form of firm assistance. Among the types of assistance identified were use of company car, company bus service, transit subsidies, carpool formation assistance and incentives, and vanpools for employee transportation. Finally, employers were asked to identify the benefits and drawbacks to company-sponsored ridesharing efforts, and indicate their involvement and satisfaction with the local ridesharing program.

Forty-eight questions were listed on the long-form employee survey, though the number of questions to be answered by any one respondent varied according to the respondent's ridesharing behavior. The questions covered travel behavior (with a subset of questions for those currently carpooling), employment characteristics, and personal as well as household characteristics. A set of retrospective questions sought information on residence, employment and commuting mode two years prior to the survey. Travel behavior questions asked about journey-to-work distance and time. Employees were asked to describe the time requirements of their job and the variability of their work schedules. They were requested to identify themselves by age, sex, and ethnic group and to describe their household according to the number of employed persons, number of licensed drivers, and income. Carpoolers were asked in detail about their work trip, with separate questions for drivers and passengers. Retrospective questions were addressed to all employees, with a subset addressed only to those who were carpooling two years ago.

Site-specific data collection efforts varied considerably among the eight demonstration sites given extensive evaluation by TSC. (The Southern California demonstration was evaluated by the grantee. Quantitative analysis of the demonstration's impact was not sufficiently rigorous to include in the cross-cutting study, but other information from the project is incorporated into this report and can also be found in the Appendix A profiles.) Data collection efforts at the eight sites ranged from simple tracking of the marketing process and costs to more sophisticated attempts to gauge the impact of demonstrations on travel behavior. Data collection of the latter kind was tried most extensively in Tidewater, Cincinnati, North Carolina and Lincoln. Tidewater's efforts came closest to establishing a reliable basis on which to judge program cost-effectiveness. It consisted of comparing the cost and ridership of bus service along several routes with the cost and ridership of a replacement service (Maxi-Taxi, later known as Maxi-Ride). Replacement services ranged from shuttle and feeder buses to jitney service.

Among projects with a major employer-marketing focus (Atlanta, Cincinnati, Houston, North Carolina, Portland) basic data collection consisted of recording the number of firms contacted and the number of applications for assistance or information received from employees. Additional efforts took the form of tracking the number of firms joining the program and the number of employees placed in carpools or vanpools. Specific market surveys of varying complexity were undertaken at several sites, including employer-oriented as well as neighborhood and regional ridesharing projects:

- The North Carolina DOT conducted a marketing survey before and after its media campaign, focusing on changes in level of awareness and means of obtaining ridesharing information among those exposed to the campaign through radio, newspaper, billboard and other publicity channels; this grantee also conducted a minor postcard survey of

park-and-ride lot users; Commuter Pool in Seattle also conducted a windshield survey of park-and-ride lot use;

- On-board surveys were conducted by Tidewater Regional Transit to gather travel behavior and socioeconomic data on riders of the bus service which was being replaced by alternative transportation and also on users of the new Maxi-Ride service;

- The City of Lincoln conducted telephone surveys of residents within the treatment and control districts for its neighborhood-based ridesharing demonstration project, to determine the impact of the program on travel behavior;

- Mail and phone surveys of those applying for rideshare matching assistance were conducted as part of the Cincinnati demonstration project;

- Atlanta demonstration efforts included two surveys of employees switching to ridesharing, once after the project started and again six months later;

- Tri-Met in Portland surveyed those requesting information about an owner-operated vanpool program.

2. DEMONSTRATION PROJECT CHARACTERISTICS

2.1 DEMONSTRATION SITES

The 17 demonstration sites to be evaluated were selected to represent various geographic regions and demographic sizes. Seven of the sites were in the South, four each in the West and North Central regions, and two in the Northeast, as the regions are defined by the Bureau of the Census. Demonstrations were successfully completed at eight sites: four in the South, two in the West, and two in the North Central regions, probably owing less to geographic location per se than to the size and complexity of operations in older urban centers such as those represented in the two Northeast sites. The population of the 17 cities selected for demonstrations ranged from fewer than 200,000 to over three million, and this range is also approximately true of the subset of eight sites where demonstrations were fully implemented.

The number of firms in each of five metropolitan areas where workplace surveys were administered ranged from approximately 26,600 to 56,300, and the number of employees at these five sites varied from approximately 531,000 to 1,417,000, as shown in Table 2-1. The five sites (all metropolitan areas) differed substantially in the amount of growth they experienced in the decade preceding the workplace survey, 1970-1980. Portland, for example, lost about five percent of its population during that time period, while Cincinnati remained stable, and Seattle, Atlanta and Houston grew by 13, 27, and 45 percent, respectively.

Table 2-1.

NUMBER OF EMPLOYERS BY FIRM SIZE CATEGORY AND NUMBER OF EMPLOYEES

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
EMPLOYERS						
Firm size						
1-19	34,800	22,416	47,000	23,700	31,600	31,907
20-99	5,100	3,417	7,700	2,470	4,200	4,577
100-499	960	655	1,400	520	600	827
>499	111	98	231	75	80	119
TOTAL	381,729	26,586	56,331	26,765	36,480	105,578
EMPLOYEES	831,729	550,000	1,416,700	530,800	711,200	808,080

Source: NRDP employer and employee workplace survey; employee figures rounded to nearest hundred.

2.2 TIME FRAME AND BUDGETS

Most of the nine case study demonstrations which were completed and evaluated operated for a period of two years. Demonstrations were defined as beginning upon receipt of NRDP funds, although in some cases project activity began prior or subsequent to this date. The earliest demonstration project began in November 1979. By July 1982 most of the demonstration activity for the nine case study sites had been completed. The remaining demonstrations took longer to get off the ground and in a few cases only began activity after the close of the two-year demonstration evaluation period. (Reasons for this delay are explained in Chapter 3.) The most intensive period of activity for the nine case study demonstrations occurred in 1980 and 1981.

The total cost of the demonstrations cannot be precisely documented for all of the projects, for several reasons. Project funds were obtained from a variety of sources in addition to the NRDP--for example, FAUS or UMTA Section 5 funds, or other state and local revenues. In addition, funds were not always separately allocated to demonstration activities as distinct from ongoing ridesharing program activities. This was particularly true where demonstration elements represented expansion or extension of existing ridesharing efforts. However, it is possible to compare NRDP grants awarded to each of the sites. These ranged from $20,000 to $370,000, as shown in Table 2-2. NRDP funds were awarded for one or two years of project activity. They represent part of the federal share of total project costs in that time period, because recipients were required to commit ongoing current funds (federal or otherwise) in return for demonstration funding. Demonstration funds were thus often supplemented with funds from such federal sources as

Table 2-2.

NRDP GRANTS FOR 17 EVALUATED PROJECTS

Project Site	NRDP Grant ($000)
Completed*	
Seattle, WA	370
Southern California	331
Houston, TX	236
Portland, OR	267
North Carolina	258
Atlanta, GA	250
Cincinnati, OH	116
Tidewater, VA	65
Lincoln, NE	20
Subtotal	1913
Not completed*	
Boston, MA	225
Chicago, IL	215
Denver, CO	210
Philadelphia, PA	150
Louisville, KY	127
Detroit, MI	60
San Antonio, TX	34
Jackson, MS	33
Subtotal	1594
TOTAL	3507

*Completed or not completed during demonstration evaluation period.

Source: FHWA records. Grants include only federal funding dollars under the NRDP program, both initial and supplemental grants where applicable. The total cost for most implemented projects was substantially higher than the amount of the NRDP grant, because state and local funding were also supplied. Federal grant amounts may differ from grantee project totals depending on whether or not all of the funds were applied to the project under evaluation; amounts are rounded to nearest thousand.

highway funds or urban mass transit aid. These funds in turn required state and local funding matches.

2.3 PROJECT ADMINISTRATION

The specific grantee for NRDP funds is listed in the project profiles found in Appendix A. In all cases the grantee was the state department of transportation. In many instances, however, the grantee was not the active administrator of the project. Instead, this function fell to the agency which had initiated the demonstration proposal or which had a historical affiliation with ridesharing activities. This group included a wide variety of agencies with differing amounts of experience in organizing and running ridesharing programs. Those governmental agencies which actively administered the projects varied considerably as well in jurisdictional scope, level of authority, staffing and budget constraints, and in their relationship to other involved agencies. Because the administering agency turned out to be critical to actual implementation of the ridesharing demonstrations in many cases, it is useful to examine the breakdown of agencies which undertook this role. This breakdown is shown in Table 2-3.

Of the public organizations, regional agencies were more likely than other grantees to get the ridesharing demonstration projects started during the demonstration period, probably because they had the most experience working with other agencies on a regular basis or in some cases managing ridesharing activities. The single regional council of governments among these agencies (the Ohio-Kentucky-Indiana Regional Council of Governments) was able to fully implement its ridesharing demonstration in Cincinnati. Three of

Table 2-3.

AGENCIES ADMINISTERING THE 17 EVALUATED NRDP PROJECTS

Regional Agencies.....8

- regional transit authorities.....4
  (Chicago, Houston, Portland, Tidewater)
- regional councils of government.....1
  (Cincinnati)
- regional planning agencies.....3
  (Jackson, Louisville, Philadelphia)

State Departments of Transportation or Highways.....5
(Atlanta, Boston, Denver, Detroit, North Carolina)

Municipal Governments or Departments.....3
(Lincoln, San Antonio, Seattle)

Private Non-Profit Corporations.....1
(Southern California)

Source: Evaluation case studies, summary memos, and TSC NRDP project information files.

the regional transit authorities were also able to implement projects, including agencies in Norfolk (Tidewater Transportation District Commission), Houston (Metropolitan Transit Authority), and Portland (Tri-County Metropolitan Transportation District of Oregon [Tri-Met]). A demonstration begun in Chicago by the Regional Transportation Authority, however, failed to materialize by the end of the evaluation period. None of the three regional planning agency projects (Central Mississippi Planning and Development District, Jackson; Kentuckiana Regional Planning Development Agency, Louisville; and the Delaware Valley Regional Planning Commission, Philadelphia, became fully operative before the end of the evaluation period.

State agencies had mixed success in fielding demonstration projects. Both the Georgia and North Carolina departments of transportation developed viable demonstrations, in Atlanta and the Piedmont Crescent, respectively, before the end of 1982. However, projects planned for Boston (Massachusetts Executive Office of Transportation and Construction and the Department of Public Works), Denver (Colorado Department of Highways), and Detroit/Southeast Michigan (Michigan Department of Transportation) did not become fully operational by the end of the demonstration period. Among the possible reasons for delay in starting these projects were the scale and complexity of operations in older urban environments, which made multi-agency cooperation difficult. Politics and a lack of commitment to ridesharing were also important factors contributing to the delay.

Municipal agencies were able to start demonstration projects at two out of three sites. The City of Seattle successfully fielded a demonstration program through its Commuter Pool agency, which had been administering

ridesharing activities for a number of years. Demonstration efforts of the City of Lincoln Transportation Department also got underway during the evaluation period. San Antonio, however, did not complete its demonstration by the close of the evaluation period. A change of political leadership during this time period resulted in a redirection of priorities and project redefinition which contributed to a slow startup at this site.

Commuter Transportation Services, Inc., the single non-profit corporation to receive NRDP funding, initiated and completed a demonstration project substantially as planned. (NRDP funds were granted jointly to both CTS and the Southern California Association of Governments, but CTS administered the project.) The project was an outgrowth of the firm's ongoing commuter ridesharing services.

2.4 STRUCTURE OF THE DEMONSTRATION PROJECTS

In order to qualify as candidates for NRDP funds, agencies were required to submit proposals which outlined the purpose and scope of their intended ridesharing projects. Proposals were submitted to FHWA in 1979. Major components of the proposals were the applicant's goals for a project as well as the demonstration elements to be designed to achieve those goals. Because many agencies received NRDP funds for programs which were at most expansions of existing ridesharing efforts, it is not possible to isolate the demonstration projects completely from ongoing ridesharing efforts. Nonetheless, the cross-cutting evaluation report emphasizes project elements which were clearly new rather than those which were simply extensions of programs already in place.

2.4.1 Individual Project Goals

Individual projects developed goals which ranged from simple to complex, and from specific to very broad objectives. In general, the number of goals varied with the amount of NRDP funding: that is, the more expensive demonstrations developed a more extensive set of goals. An assessment of the demonstrations' impact is given later, in Chapter 5. However, focused, simple goals appear to have been more successful than more elaborate ones, and were, in any case, more straightforward to evaluate. Summaries of goals for all 17 sites are given in Appendix A, but the broad goals of reducing pollution and easing traffic congestion by promoting shared-ride vehicle use were common to many sites.

The five case study demonstrations which administered workplace surveys developed goals in two ways: two sites set very specific, quantitative objectives; the three remaining sites essentially considered implementation of their demonstration elements to be goals.

Specific goals seemed best met when they were tied to major demonstration efforts, such as Seattle's emphasis on increasing the utilization of its park and pool lots by 10 percent. Goals less directly related to project efforts, such as Atlanta's objective of reducing peak-hour congestion by five percent, and to increase average vehicle occupancy from 1.2 to 1.4 percent, appeared to have less chance of being met--and also of being measured. At the other extreme, Cincinnati and Houston essentially turned project elements into goals, so that implementing the demonstration was tantamount to achieving at least some stated goals. For example, marketing ridesharing to a certain

number of firms, or increasing the capabilities of a computer matching system were among the goals at these sites. Even if data were collected to measure progress toward these goals, however, it often did little more than document a process (e.g., number of firms reached, number of applications processed), because the goals were not oriented toward a change in thinking or behavior. One project's goals, such as that of "increasing ridesharing," pointed to a direction but not an amount of change, and so were of little practical use as measures of program success.

Goals of the three case study demonstrations evaluated by TSC were simple, and for the most part closely related to a single project element. Tidewater had as its goal to demonstrate the feasibility of supplanting and/or supplementing conventional transit in low ridership demand areas with contracted taxi or jitney service. Determining the cost-effectiveness of the service alternative was also part of Tidewater's objective. In Lincoln the project goal was to promote ridesharing and transit use for all trips, as a complement to the city's ongoing home-work trip marketing. The North Carolina demonstration project developed a broad set of goals, but among the most useful was an emphasis on expanding the size and coverage of existing ridesharing programs to match regional commuting patterns. This was done using a combined marketing and park-and-ride lot development effort, which promoted a ridesharing message while providing commuters with increased opportunities to try ridesharing.

2.4.2 Demonstration Elements

The discussion here is confined to major ridesharing project elements which were both actually implemented in the course of demonstration projects and at least minimally evaluated. All of the case study demonstrations are included. Table 2-4 lists the main implemented demonstration elements and the sites at which they comprised a significant part of project efforts. Elements of programs which were never realized during the demonstration period, as well as those which had just begun at the conclusion of the demonstration (and hence were not evaluated), are included with project profiles in Appendix A.

Employer-based marketing--or the promotion of ridesharing to firms rather than the general commuter market or households--was the most common demonstration element. This is not surprising, since many ridesharing programs already had a substantial employer marketing focus. Four of the five major demonstration sites focused at least in part on marketing ridesharing to firms, as did the project in the Piedmont Crescent of North Carolina. (Seattle undertook employer-based marketing, but not as part of the funded demonstration project, so this activity is not included here.) Approaches to employer-based marketing were of two types: promotion to target firms and promotion at a site which included a large number of firms--for example, an industrial park. Most demonstrations incorporated some portions of each approach. Marketing activities to both single firms and multi-employer sites included computerized and other matching services, the use of transportation coordinators at the firms to promote ridesharing, the presentation of workshops on ridesharing to employers, and a number of related incentive and promotional efforts.

Table 2-4

DEMONSTRATION ELEMENTS OF NRDP PROJECTS IMPLEMENTED AND EVALUATED

Demonstration Element	Atlanta	Cincinnati	Houston	Lincoln	North Carolina	Portland	Seattle	Tidewater
Employer-based marketing	X	X	X		X	X	X	
Park-and-ride lots	X	X	X		X		X	
Vanpools		X				X	X	
Legislative initiatives					X	X	X	
Regional marketing		X			X			
Shuttle bus service				X				X
Neighborhood marketing				X				
Shared-ride taxi and jitney service								X
Flextime							X	

Source: Case studies of eight NRDP projects implemented and evaluated, as listed in References; elements include only major demonstration elements which were funded by the NRDP.

Development of park-and-ride lots was among the incentives to ridesharing recommended by the National Task Force on Ridesharing. Four of the five major NRDP evaluation sites (Atlanta, Cincinnati, Houston, Seattle) included park-and-ride lots among their demonstration elements, as did North Carolina. Efforts ranged from encouragement of ridesharers' parking in formerly unused or little-used paved areas to establishment of specific "staging sites" for carpool arrangements. Park-and-ride lot signs were used to advertise ridesharing in one project, while another concentrated on promoting the use of the lots in the central business district (CBD).

Three kinds of vanpool efforts were undertaken: shared use of commuter vanpools by social service agencies during the midday period between commuting hours (Seattle); encouragement of owner-operated vanpools for commuting (Portland); and initiation of a regionwide third-party vanpool program (Houston). At the same time, vanpool efforts proved difficult to get off the ground, and the efforts proposed were more ambitious than those realized.

Legislative initiatives included both efforts to identify and/or remove legislative barriers to ridesharing, as well as passage of laws to act as ridesharing incentives. Among the legislative activities of the three sites which undertook them were modification of state laws pertaining to vanpool liability and identification of an array of legislative changes which would encourage ridesharing. In Seattle, zoning code amendments were made, to allow substitution of ridesharing agreements for parking requirements in new developments.

Two sites included substantial regional marketing elements in their ridesharing demonstrations. Both campaigns focused on the use of freeway signs and billboards to get the ridesharing message across. Other kinds of promotions and advertisements, including a ridesharing film, were developed for regional marketing. Two sites also developed neighborhood-based ridesharing programs. One of these projects focused exclusively on increasing ridesharing for all trips by personal contact in the several neighborhoods. Another used direct mail and other techniques in marketing ridesharing to households.

Three demonstration elements were unique to their sites: promotion of shared-ride taxi and jitney service, use of transportation coordinators, and flextime. Shared-ride services in various markets were the principal focus of the Tidewater demonstration.

3. PROJECT IMPLEMENTATION AND OPERATION

All of the NRDP ridesharing projects faced an array of obstacles in beginning and continuing operations, both anticipated difficulties (such as fear of competition on the part of ridesharing programs at other agencies) as well as unexpected ones (such as staff or budget cuts). Nevertheless, some projects managed to begin and complete operations in the allotted time frame. This section describes some of the difficulties which the 17 projects faced. For this purpose, all of the projects are examined, since many of the delayed demonstrations provide the best evidence of problems encountered. Because many of the problems were beyond local control, they are discussed anonymously. The section also analyzes institutional barriers--those which face most ridesharing programs, because they are ubiquitous in the ridesharing environment. Finally, the chapter discusses some factors which seem to be associated with success in starting and running a ridesharing program.

3.1 PRACTICAL BARRIERS TO PROJECT STARTUP

Practical barriers to project startup fell into three broad categories: problems internal to the responsible agency; local problems external to the agency; and problems which could only be solved at the Federal level, if at all. Although described here in terms of discrete problems, more often these obstacles were interwoven and not easily resolved.

To begin with, most of the demonstration proposals were ambitious undertakings, with numerous and diffuse project elements. Often the

relationship between these elements was unclear. Management of such projects required skills in organization, coordination, and leadership. Inadequate resources within the local agency was a common problem among NRDP projects which failed to materialize in the given time frame. This problem took a variety of forms. Some agencies underestimated manpower requirements and simply had too few people to manage the demonstration project as defined. Others experienced a high rate of staff turnover, or layoffs, which slowed or stopped efforts to get underway. Still others had little experience in operations management of the sort required to launch and track ridesharing demonstrations on the scale proposed.

Another difficulty, one usually external to the agency itself, was funding. Many demonstrations were outgrowths or expansions of existing programs which were funded by a combination of sources, including local, state and Federal funds. If one funding area collapsed, a demonstration frequently had to be redefined on a reduced scale, because its elements were interdependent. Changes in revenue tax sources or allocations as well as annual budget revisions could (and did) adversely affect the ridesharing projects. The lack of a defined political constituency for ridesharing often made it difficult to secure replacement funds. Delay in receipt of federal approval also resulted in the revision or reduction of some demonstration programs, and is discussed further below. In some cases, these difficulties accounted for delays of a year or more in getting a project started. In addition, competition from ridesharing or vanpooling programs at other government levels or other departments within the same agency sometimes diverted resources from the demonstration project.

More fundamentally, a lack of lead agency authority and a confusion of project responsibilities had serious negative effects on many of the programs which involved more than one local agency. This was particularly true at those sites whose agencies had "a long tradition of everyone going their own way," as one summary memo notes. With no clear-cut mandate (owing to the complexity of the proposed program) and no obvious leader, many multi-agency projects foundered. As another summary memo noted, "The perception of common interest was not strong enough to force the agencies to overcome both their tradition of working separately and their greater interest in their own programs until the lack of coordination became ridiculous and harmful." A third summary memo commented, "No agency or individual appeared to have, as a goal, the success of this demonstration, and nobody followed through."

At the Federal level, several circumstances made the local task more difficult. Delay in proposal approval was among the most important of these factors and caused a chain reaction which was difficult to stop. For example, faced with delays of half a year or more, some projects lost momentum and initiative. By the time Federal approval came, the local funding environment or agency resources had changed, making it necessary to develop a new proposal, obtain local and state approval all over again, and submit revised plans to the Federal Government. These revisions usually involved delays at the state and local level. In addition, some local agencies knew little about the Federal approval process and so submitted unrealistic demonstration time schedules, which could not be met. Federal requirements were stipulated in all solicitation notices and demonstration award letters. Nonetheless, the requirements apparently caused difficulties for some projects.

In particular, the need for a 13(c) agreement was found onerous at some sites. Section 13(c) is the labor protection clause of the Urban Mass Transportation Act. It requires that no existing public transportation employee be made worse off as a result of an agency's receipt and use of federal funds. To preclude displacement of transit employees, any agency receiving UMTA Section 6 funds must negotiate an agreement with the workers who may be affected by services begun under the grant project. Anxiety over the effects of ridesharing proposals on transit worker job security prompted discussion of a 13(c) agreement at five sites. Only one of these projects became operational during the demonstration period, in part owing to wrangles over a 13(c) agreement. In several cities, for example, 13(c) negotiations meant delays of over a year, and associated difficulties ultimately doomed the projects. Two sites, Denver and Jackson, MS, on the other hand, were able to negotiate 13(c) agreements without any difficulties. At several sites, FHWA funds were used instead of UMTA funds, to eliminate the need for a 13(c) agreement.

Several demonstrations, on the other hand, could possibly have benefited from additional supervision and monitoring at the Federal level. Where the administrative agency lacked sufficient authority to mobilize other departments involved in the ridesharing project, Federal Government intervention might have helped to galvanize local action. It is not clear how this could have been done, however, given the FHWA's requirement to work through the state and its own divisional offices.

3.2 OVERCOMING INSTITUTIONAL BARRIERS

Although many of the factors which prevented successful completion of the ridesharing demonstrations were under the control of one or more agencies, some obstacles were part of a larger environment which is not receptive to ridesharing programs. Perhaps the easiest--certainly the most straightforward--part of this environment to alter is the institutionalized portion, i.e., those barriers to ridesharing which have become codified in custom or law. Over the past decade, many of these fundamental barriers to ridesharing have been removed, and most states permit ridesharing operations (9: p. 4 ff.). Several demonstration projects worked to identify and change institutional barriers, and a few actively promoted incentives to ridesharing as well. Among the legal barriers addressed by the demonstration programs were issues of zoning, vanpool driver liability and competition with public transit. Employer fear of union organizing and related activities which might result from circulation of rideshare matching lists also presented difficulties at two demonstration sites.

Portland tried to identify restrictions on ridesharing which could be eased by changes in legislation or policy; one bill (SB 53) eliminating various restrictions on vanpool operations was proposed and later adopted by the state legislature. North Carolina worked successfully to ease state liability laws stemming from vanpool operation which were viewed as barriers to development of this mode. In Seattle, zoning code amendments were enacted which enabled development of commercial park-and-ride lots at many sites previously closed off from such operations. Fifty-five incentives to ridesharing were also identified at this site, including some incentives which

would allow Federal tax breaks for vanpool owner-operators. Efforts to secure passage of Federal legislation offering tax incentives for employer-sponsored rideshare programs and individually-owned vanpools were not successful. An attempt to develop state ridesharing incentives and put them into place in Portland was also abandoned because of poor economic conditions.

One labor issue that emerged during the demonstrations was employer fear of union organizing that might result from employees' getting together to rideshare. This fear was apparently a partial factor preventing development of ridesharing operations in Jackson, MS and delaying a vanpool program in the Piedmont Crescent region of North Carolina.

3.3 FACTORS ASSOCIATED WITH SUCCESSFUL IMPLEMENTATION

This section discusses factors which appear to be associated with successful implementation of a ridesharing demonstration program, based on assessment of evidence in the 17 case study reports and summary memos. The factors are limited to those which were under grantee control. The basic measure of success was defined as implementation of project elements in a timely fashion. From a federal policy perspective, a project was seen as additionally successful if it achieved its goals and the results contributed significantly to the general level of understanding about ridesharing program operations. In this context, even "unsuccessful" efforts provided useful information for future ridesharing program design.

3.3.1 Project Design

Ridesharing demonstrations which were successfully implemented began with clearly defined projects. Project goals were simply stated in measurable (not necessarily numerically quantified) terms. Project objectives represented a marked departure from the existing program, which made measurement of change possible. Project goals were designed to make best use of available resources, which had been carefully assessed. The administering agency of a successful project had sufficient experience in project management on the scale required to see the demonstration through. Such an agency was also skilled in working with other departments and local agencies which might be involved in the ridesharing project, and had experience working cooperatively with other agencies. Finally, the agency administering a project which contributed to overall knowledge about ridesharing carefully tracked behavioral change and cost data.

The ridesharing project in Tidewater presents one example of a demonstration which was successful both individually and in terms of the NRDP. In the first place, the project set out to resolve a concrete issue: in this case, to show whether replacing fixed-route bus service with taxi or jitney service in low-demand areas was feasible and cost-effective. The project was similar to an experiment, in that it was designed to determine whether or not changing from the status quo would be an improvement, in terms of transportation cost and performance. Several kinds of replacement techniques were selected for the demonstration, including feeder service, selective time-of-day replacement service, jitney service, and the like. The transit

agency for the region was both the grantee and the project administrator, thus minimizing inter-agency coordination requirements.

The Tidewater demonstration was developed in spite of market research done two years before the grant application which predicted little demand for a service similar to the proposed one. In fact, the demonstration confirmed the validity of this earlier market study, finding that demand was insufficient to support all but one of the new services, the jitney service. Although ideally it would be preferable to undertake demonstrations based on positive market research (i.e., research which indicates demand for a proposed service change), it is at least useful to have a real question answered in the course of a demonstration. The demonstration also yielded useful information on the relative costs of various alternative services: while per passenger costs of the replacement services were higher, the services resulted in lower total costs for the transit system.

3.3.2 Organization and Coordination

The North Carolina demonstration is a second project which worked very well. Although its goals were not so neatly defined as those of Tidewater, the demonstration nonetheless generated new information about ridesharing, some of it perhaps unintentionally. The North Carolina demonstration showed the relative effectiveness of three differently organized ridesharing programs within the state's Piedmont Crescent region, finding strengths and weaknesses within each approach. It was in fact the only demonstration to examine various organizational structures for ridesharing, though this examination seems to have evolved out of the project's original goals rather than served

as a goal in its own right. Although the project involved numerous agencies, it was administered by the grantee, a state agency which was able to work cooperatively with other involved parties.

Among the more elaborate case study projects, the Cincinnati demonstration yielded some of the most useful information about ridesharing techniques. For example, the project provided good evidence that marketing ridesharing through neighborhood channels is not effective. While the evidence is not conclusive, it strongly suggests that ridesharing program efforts are better focused on firms than individual households. One characteristic of the project which may have contributed to its success was the use of a multi-agency task force to define the project beforehand.

4. RIDESHARING ARRANGEMENTS AND PARTICIPANTS

This section of the cross-cutting report describes the markets for ridesharing, both in terms of individual ridesharers and in terms of employers who are potential participants in ridesharing programs. The discussion of ridesharing arrangements and participants relies mainly on analysis of data from the uniform workplace survey administered by the grantees at five demonstration case study sites--Atlanta, Cincinnati, Houston, Portland, and Seattle--for two reasons. First, the same questions were asked from one site to another, so composite profiles could be drawn of firm and individual ridesharing behavior. Second, the information was quantified, and thus expressed in comparable units of measurement from one site to the next.

Qualitative information from reports on the remaining four sites which actually fielded projects during the demonstration period (Lincoln, North Carolina, Southern California and Tidewater) is, however, incorporated into Chapter 5, which discusses the impact of the various programs on ridesharing behavior. Appendix C describes data analysis and weighting methodology.

4.1 EMPLOYEE RIDESHARING

4.1.1 The Ridesharing Commute Mode Choice

The workplace survey asked respondents to identify their primary current (i.e., 1982) means of transportation to work, and also the mode they used two years prior to the survey. Results of the survey questions showed no

significant change in the mode split for commuters from 1980 to 1982. In fact, few changes of any magnitude occurred, as shown in Table 4-1.

The level of employee ridesharing in 1980 was similar at three of the five sites to the national average for ridesharing to work that year of 19.7 percent (5: p. 18). Seattle was only slightly lower, at 17.2 percent. Houston, however, had a much higher ridesharing mode split, 25.9 percent. This disparity is probably explained by the relatively sparse public transit service and the change in employment level in Houston during recent years. While population and employment have grown rapidly, public transit services have not developed at the same pace, so many commuters are choosing to rideshare.

This situation offers some insight into the tradeoffs made by commuters in their choice of mode. To a certain extent, ridesharing and public transit share a similar travel market for short distances, and each can be expected to gain some participants at the expense of the other under certain conditions. For example, ridesharing may be faster or more comfortable than transit, but it is not always a preferable mode during commuting hours, when transit can offer more flexibility than ridesharing. To many commuters, "rigidity" (which ridesharing requires) is a greater problem than loss of time (10: p. 4).

4.1.2 Factors Associated with Ridesharing

Sociodemographic, motivational and employment characteristics of ridesharers were examined by cross-tabulating responses to the employee

Table 4-1.

1980 and 1982 COMMUTE MODE SPLIT
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
1980						
Ridesharing	19	20	26	21	17	21
Single-occupant auto	72	67	61	61	58	64
Public transit*	7	10	11	13	20	12
Other**	2	3	2	5	5	3
	100	100	100	100	100	100
N =	3201	2185	2210	2531	2668	12795
1982						
Ridesharing	19	20	28	19	16	20
Single-occupant auto	72	70	63	63	60	66
Public transit*	7	8	8	14	21	12
Other**	2	2	1	4	3	2
	100	100	100	100	100	100
N =	3578	2391	2218	2762	2843	13792

*Includes subscription bus
**Includes walk, cycle, taxi, "other" responses, and, in Seattle, ferry.

Source: NRDP employee workplace survey.

workplace survey. Some of the results confirmed previous findings, while others extended or contradicted earlier ridesharing research.

Results of the survey analysis confirmed studies showing a relationship between sex and propensity to rideshare (11: pp. 20-22). At all workplace survey sites, the ridesharing mode split was higher for women workers than for men, as shown in Table 4-2. (A second comparison, controlling for possession of a valid driver's license, made no appreciable difference in results.) On the other hand, survey results as shown in Table 4-3 showed no consistent relationship between age and propensity to rideshare, a finding that conflicted with others suggesting that ridesharers are disproportionately represented within certain age groups.

Evidence associating income with ridesharing was less clear-cut. At three sites, employees with (1982) household incomes below $15,000 were more likely to rideshare than employees in most other income groups. At another, workers in this lowest income bracket were least likely to carpool. It was hypothesized that auto ownership may be a better variable than income to explain mode choice.

In fact, results of the workplace survey showed a correlation between ridesharing and car ownership patterns. As shown in Table 4-4, ridesharing employees at all sites were more likely than the average employee to have more than zero and less than one car in their household. At the same time, ridesharing employees were less likely than the average employee to have two or more automobiles per employed household member. This is logical, for several reasons. First, as will be discussed later in the report, most

Table 4-2.

1982 RIDESHARE MODE CHOICE BY SEX OF RESPONDENT
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
male workers	14	16	22	18	15	17
female workers	18	22	34	21	18	23

Source: NRDP employee workplace survey.

Table 4-3.

AGE DISTRIBUTION OF RIDESHARING EMPLOYEES AND ALL EMPLOYEES
(%)

	Atlanta		Cincinnati		Houston		Portland		Seattle		Five-Site Average	
	RS	All	RS	All	RS	All	RS	All	RS	All	RS	All
age in years												
18-25	22	19	32	28	29	26	23	23	25	24	26	24
26-35	37	37	28	33	36	37	33	33	34	33	34	35
36-45	22	23	21	17	18	19	22	23	23	23	21	21
46-55	16	15	14	12	11	11	11	13	14	12	13	13
56-66	3	6	6	9	6	6	11	9	5	7	8	7
	100	100	100	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace survey.

Table 4-4.

DISTRIBUTION OF AUTOS PER EMPLOYED HOUSEHOLD MEMBER FOR RIDESHARING EMPLOYEES AND ALL EMPLOYEES
(%)

	Atlanta		Cincinnati		Houston		Portland		Seattle		Five-Site Average	
	RS	All	RS	All	RS	All	RS	All	RS	All	RS	All
# of autos												
none	5	5	3	3	5	3	0	3	1	3	3	3
.01-.99	13	8	25	16	27	16	25	18	25	17	23	15
one	51	47	49	54	53	59	59	55	48	50	52	53
1.01-1.99	21	20	13	11	5	8	6	7	13	12	11	12
two	8	15	8	12	9	13	9	14	11	14	9	14
>two	2	5	2	3	1	1	2	2	2	4	2	3
	100	100	100	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace survey.

ridesharers drive some of the time, which necessitates at least partial access to a car. Second, as will also be seen in later sections, a large proportion of carpools involve two family members commuting together, which would require household access to a car. Finally, the availability of two or more cars per employed household member eliminates much of the need to carpool.

Responses to the workplace survey question asking riders to give the reasons for their choice of mode confirmed earlier findings that ridesharers are more motivated by cost savings than are other commuters in making a mode choice. Ridesharers mentioned cost as the most important consideration more often than all commuters did, as shown in Table 4-5. However, ridesharers were also found to be motivated by considerations similar to those of other commuters: that is, convenience, travel time, schedule requirements and unavailability of transit, as Weisbrod and Eder have noted (12: p. II-4).

Among the job-related factors shown by the workplace survey to be associated with employee propensity to rideshare were firm size, distance to work, full versus part-time work, and work schedule. Surprisingly, a lack of free parking, either employer provided or available on-street, did not appear to be associated with increased ridesharing where transit service was good. Firm size was highly correlated with employee ridesharing behavior. For all sites, the proportion of employees ridesharing to work was higher at firms with more than 100 employees than it was at smaller firms, as shown in Figure 4-1. This finding was consistent with earlier and recent research--for example, work done by Wiley-Jones et al. in Wisconsin. (13: p. IV-6) The positive association between firm size and level of ridesharing is due to several factors. The larger the firm, the greater the number and density of

Table 4-5.

DISTRIBUTION OF FIVE MOST FREQUENTLY OCCURRING PRIMARY MOTIVES FOR MODE CHOICE AMONG RIDESHARING EMPLOYEES AND ALL EMPLOYEES (%)

	Atlanta		Cincinnati		Houston		Portland		Seattle		Five-Site Average	
	RS	All	RS	All	RS	All	RS	All	RS	All	RS	All
motives												
low cost	38	17	23	15	30	14	25	16	24	15	28	15
fast travel time	10	18	16	17	11	19	17	19	18	19	14	18
convenience	21	30	29	31	25	26	27	29	29	29	26	29
schedule requirements	15	13	11	11	8	11	6	8	9	10	10	11
transit unavailable	4	7	10	9	8	8	6	4	2	3	6	6
sum of all other motives	12	15	11	17	20	22	19	24	18	24	16	21
	100	100	100	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace survey.

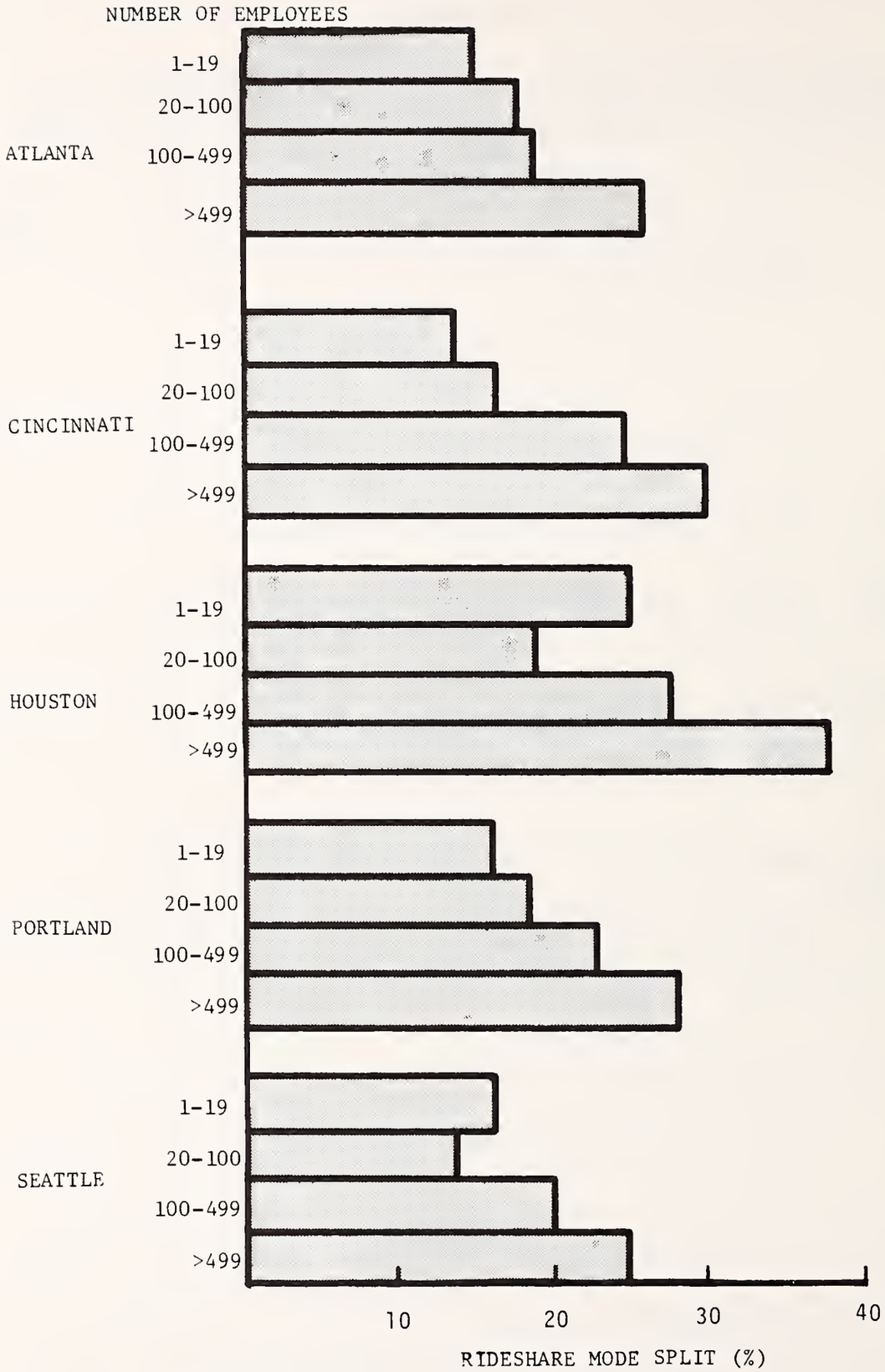


Figure 4-1.

1982 EMPLOYEE RIDESHARE MODE SPLIT BY FIRM SIZE CATEGORY

potential poolers at one location and thus the greater a worker's chances of being exposed to ridesharing requests and of finding a suitable co-rider.

Mean distance from work among the major demonstration sites was 11.7 miles, ranging from under 10 miles to over 14 miles, as seen in Table 4-6. Ridesharing was found to be a more likely mode choice as distance from work increased. Mean distance to work for ridesharing employees was significantly higher than for those who drove alone at all five sites, and significantly higher than for bus users at all sites except Houston. The research of Brunso and Hartgen; Kulp, Tsao and Webber; Heaton et al. and others has also related ridesharing to increased distance from work (14, 15, 16). The higher cost of individual auto trips over longer distances and the decreased availability of public transit make ridesharing comparatively more attractive for longer journeys to work.

Full time workers at all sites were more likely than part-timers to rideshare. This finding was consistent with the positive association also found between fixed work hours and propensity to rideshare.

At all sites, survey results showed higher ridesharing mode splits for employees on fixed-hour or employee-set fixed schedules than for those on rotating shift or irregular schedules, as described in Table 4-7. Employees with flexible-start schedules also showed a greater tendency to rideshare than those with rotating or irregular schedules, at all sites except Houston. Flexible-start schedules were understood to mean those requiring a fixed

Table 4-6.

AVERAGE EMPLOYEE COMMUTE DISTANCE BY 1982 COMMUTE MODE
(in miles)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Ridesharing	18.2	12.8	15.6	13.0	14.3	14.8
Single-occupant auto	12.4	10.9	13.5	9.5	10.9	11.4
Public transit*	12.8	9.2	15.4	8.7	11.8	11.6
Other**	2.6	1.3	8.5	1.8	9.8	4.8
All modes	13.3	11.0	14.2	9.8	11.7	12.0

*Includes subscription bus.

**Includes walk, cycle, taxi, "other" responses and, in Seattle, ferry.

Source: NRDP employee workplace survey.

Table 4-7.

1982 EMPLOYEE RIDESHARE MODE SPLIT BY TYPE OF WORK SCHEDULE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Schedule type						
fixed hours	21	20	31	20	19	22
employee-set fixed schedule*	23	18	30	24	19	23
flexible start**	14	26	22	22	11	19
rotating shift	13	13	24	10	8	14
irregular schedule	7	13	14	11	6	10
all schedules	19	20	28	19	16	20

*Employee sets work schedule which is thereafter fixed.
**Employee can vary start time each day.

Source: NRDP employee workplace survey.

number of work hours per day while allowing the worker to choose a start time, usually from a range of hours.

However, when compared with ridesharing among those on fixed hours, ridesharing among employees with flexible-start schedules presented a mixed picture. At three sites (Atlanta, Houston, Seattle), employees with flexible-start schedules were less likely to rideshare than those with fixed-hour or employee-set fixed schedules. In Cincinnati, employees with flexible-start schedules were more likely to rideshare than those on any other type of schedule. In Portland, employees with flexible-start schedules were less likely to be ridesharing than those with employee-set fixed schedules, but more likely to be ridesharing than those with regular fixed hours. On the basis of this finding, the introduction of flexible work hours, i.e., employee-set fixed schedule or flexible start, cannot be said to increase or decrease ridesharing.

To see whether there was a difference in carpool formation patterns between carpoolers working fixed hours and those with some flexibility in their schedules, carpooler responses to the question of how they formed their carpool were cross-tabulated with responses to a question about type of work schedule (see Table 4-8). Carpools formed with household members or through informal work contact made up 82 percent of all carpoolers at the five sites. At three of the five sites, carpoolers with some flexibility in work hours were more likely than carpoolers on fixed schedules to have formed their carpools with household members. A significantly lower percentage of the flexible-schedule carpoolers had formed their carpools through informal work contact. At the fourth site, Houston, the same differences were observed and

Table 4-8.

DISTRIBUTION OF CARPOOL FORMATION PATTERNS AMONG CARPOOLERS WITH DIFFERENT TYPES OF WORK SCHEDULES
(FIVE-SITE AVERAGE)
(%)

	Type of Work Schedule			
	Fixed hours	Employee-set fixed schedule	Flexible start	All schedule types
How carpool was formed				
Household	35	48	48	38
Informal work contact	48	32	35	44
Other	17	20	17	18
	100	100	100	100

Source: NRDP employee workplace survey.

were statistically significant using one test but not another. At the fifth site, Cincinnati, no difference in carpool formation patterns between those on fixed schedules and those with some flexibility in schedules could be observed.

These results suggest that flexible work hours may facilitate carpool formation among working family members, particularly those employed by different firms, by making it easier for them to commute together. At the same time, work hour flexibility may hinder carpool formation through informal work contact by employees of the same firm, because it encourages schedule diversity. Carrying this hypothesis further, increases in carpooling among household members working flexible hours may tend to cancel out decreases in carpooling begun through informal work contact, in the same flexible work hour environment. The net results would confirm the observation above, that flexible working hours have little overall effect on rideshare mode split.

Earlier research on the relationship between ridesharing and flextime is mixed, with Kulp et al. showing an association between ridesharing and regular hours and studies such as Bonsall et al. suggesting the relationship is more ambiguous (15: p. 86; 11: p. 17). It is possible that flexible working hours may have positive or negative effects on ridesharing, depending on whether the flexible hours are promoted as part of a more comprehensive ridesharing program.

The availability of free parking at the work site was found to have little impact on the rideshare mode split at sites with good transit service. An employee was defined as having free parking available if his employer

furnished enough free parking spaces for at least 75 percent of the firm's workers, or if the worker himself said that free parking was available within one-quarter mile of his work site. With parking spaces supplied at a rate equal to 75 percent of the site work force, enough should be available on a given day to any employees wanting them, because some workers will be on vacation, out sick, on travel, carpooling with a fellow employee, or using transit to get to work (based on calculations performed by Curry and Martin [17]). At all sites except Houston, survey results showed no significant difference in the ridesharing mode split between employees who had free parking available and those who did not (see Table 4-9). In Houston, the ridesharing mode split was significantly higher for employees who did not have free parking available.

These results were at first seen as counterintuitive, on the assumption that the absence of parking spaces would encourage employees who prefer driving alone to carpool instead. It was hypothesized that this disincentive effect was being masked by the absence of firm location information. To test this possibility, an employee's mode choice and access to parking were crosstabulated with the location of his firm--whether downtown or not. Firm location information was available for only three sites. At two of these sites, Seattle and Portland, the rideshare mode split for employees with free parking available was not significantly different for those working downtown versus those working in non-downtown locations. In Houston, where work site locations were coded as "downtown," "activity center," and "other," the rideshare mode split was not significantly different for workers at downtown versus "other" locations. At activity centers, though, the rideshare mode split was significantly higher where free parking was not available.

Table 4-9.

1982 EMPLOYEE RIDESHARE MODE SPLIT BY AVAILABILITY OF FREE PARKING AT THE WORK SITE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Free parking	20	19	26	20	17	20
No free parking	19	17	33	23	18	22
All work sites	20	19	27	20	17	20

Source: NRDP employer and employee workplace survey.

At all sites, the drive alone mode split was much higher and the transit mode split much lower for employees who had access to free parking, as shown in Table 4-10. Where free parking was not available, a decrease in solo driving was almost exactly offset by an increase in use of transit at all sites except Houston. The results obtained here are consistent with a comparison study of employer-subsidized parking and mode choice in downtown Ottawa and Los Angeles (18), which showed that the imposition of higher parking rates reduced solo driving and increased transit use at both sites. Rideshare mode split was unaffected in Ottawa, but increased at the Los Angeles site from 16 percent to 27 percent.

It appears that the need to pay for parking substantially increases the cost of driving alone to work. Many would-be solo drivers thus choose to rideshare or use transit. Where transit service is good, most of these drivers use transit, even if it takes longer, because it offers them greater flexibility than carpooling. Where transit service is poor, a greater percentage rideshare. Because parking fees also increase ridesharers' commuting costs, however, some workers who would otherwise carpool also choose transit, the extent of such use depending again on the quality of the transit service.

Thus, at work sites requiring parking fees in Atlanta, Cincinnati, Portland, Seattle, and Ottawa, where transit service was good, the number of solo drivers deciding to rideshare was just about offset by the number of ridesharers deciding to take transit. At work sites requiring paid parking in Houston and Los Angeles, where transit service quality was poorer (the Los Angeles data were obtained in 1969), the number of solo drivers choosing to rideshare exceeded the number of ridesharers turning to transit.

Table 4-10.

1982 COMMUTE MODE SPLIT BY AVAILABILITY OF FREE PARKING
AT THE WORK SITE
(%)

	Atlanta		Cincinnati		Houston		Portland		Seattle		Five-Site Average	
	F*	N**	F	N	F	N	F	N	F	N	F	N
Ridesharing	20	19	19	17	26	33	20	23	17	18	20	22
Single-occupant auto	73	63	75	54	72	40	70	34	70	35	72	45
Public transit***	5	17	4	29	2	27	7	40	11	40	6	31
Other****	2	1	2	0	0	0	3	3	2	7	2	2
	100	100	100	100	100	100	100	100	100	100	100	100

*F = Free parking available

**N = Free parking not available

***Includes subscription bus

****Includes walk, cycle, taxi, "other" responses and, in Seattle, ferry.

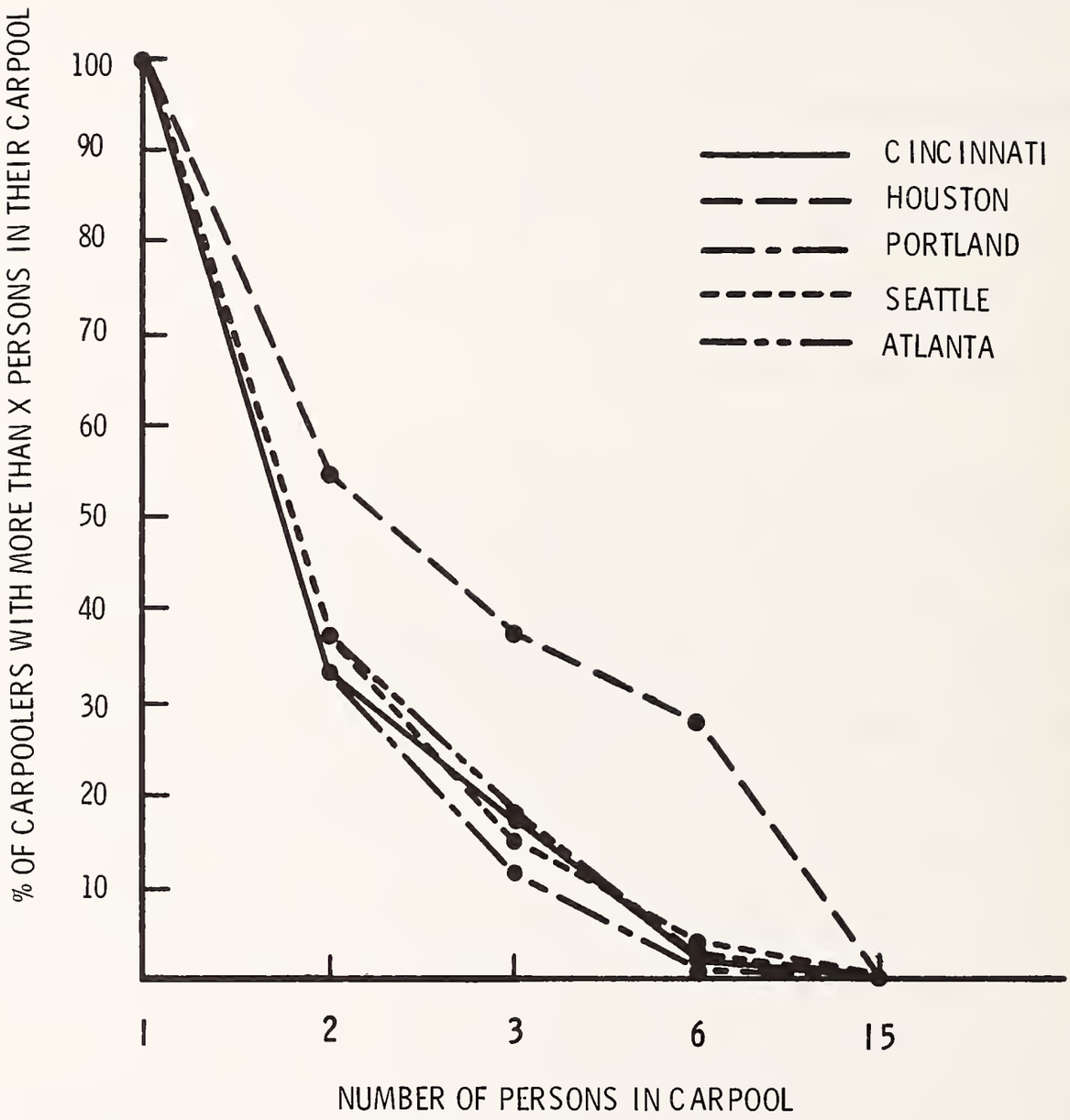
Source: NRDP employer and employee workplace survey; values less than .5% listed as zero.

4.1.3 Carpool Arrangements

Survey results were examined for information on the size, composition, formation patterns and dynamics (or movement into and out) of carpool arrangements. Analysis of survey questions about carpool size and composition showed more than half of all carpoolers at most sites to be in two-person carpools, as described in Figure 4-2. While women were more likely than men to carpool, as already seen, men were more likely to drive in a carpool than women. Most women drove at least some of the time, as shown in Table 4-11, a finding again consistent with Bonsall et al. and other research (11).

The proportion of riders in carpools whose members belonged to the same household was found to decrease with carpool size, while the proportion of riders in carpools whose members worked for the same employer increased with carpool size. For example, a high proportion of the members of two-person carpools were found to live in the same household, which is not surprising, because of the ease of making and changing arrangements and the absence of circuity at the home end. On average, 54 percent of those riding in two-person carpools shared the ride with a family member, as shown in Table 4-12. By contrast, only one-third of the members of three-person carpools shared the ride with one or more family members. Only 27 percent of those riding in four- to six-person carpools and only 15 percent of those in vanpools shared the ride with one or more family members.

An examination of the proportion of riders in carpools whose members worked for the same employer showed that, on average, about 56 percent of the persons in two-person carpools shared the ride with a fellow employee (see



Source: NRDP employer and employee workplace survey

Figure 4-2.
CUMULATIVE DISTRIBUTION OF CARPOOLERS BY CARPOOL SIZE

Table 4-11.

DISTRIBUTION OF CARPOOLERS BY FREQUENCY OF SERVICE AS DRIVER AND SEX OF RESPONDENT
(%)

	Atlanta		Cincinnati		Houston		Portland		Seattle		Five-Site Average	
	M	F	M	F	M	F	M	F	M	F	M	F
How often serve as driver*												
Always	42	16	29	24	30	18	38	19	52	23	38	20
Sometimes	40	58	57	39	64	77	57	77	26	39	49	58
Never	18	26	14	37	6	5	5	5	22	38	13	22
	100	100	100	100	100	100	100	100	100	100	100	100

*Results limited to responses of carpoolers holding valid driver's license.

Source: NRDP employee workplace survey.

Table 4-12.

DISTRIBUTION OF NUMBER OF OTHER CARPOOL MEMBERS FROM THE SAME HOUSEHOLD BY CARPOOL SIZE
(%)

	Atlanta				Cincinnati				Houston			
Carpool size:	2	3	4-6	7+	2	3	4-6	7+	2	3	4-6	7+
Other members in same household												
0	49	57	59	51	49	75	75	96	42	68	90	97
1	51	11	16	19	51	16	8	0	58	15	4	3
2	NA	32	9	0	NA	10	3	4	NA	17	1	0
3	NA	NA	2	0	NA	NA	11	0	NA	NA	5	0
4+	NA	NA	14	30	NA	NA	4	0	NA	NA	0	0
	100	100	100	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace survey; results rounded to nearest percent; values less than .5% listed as zero.

Table 4-12, (cont.)

DISTRIBUTION OF NUMBER OF OTHER CARPOOL MEMBERS FROM THE SAME HOUSEHOLD BY CARPOOL SIZE
(%)

	Portland				Seattle				Five-Site Average			
Carpool size:	2	3	4-6	7+	2	3	4-6	7+	2	3	4-6	7+
Other members in same household												
0	53	63	71	100	39	69	77	80	46	66	74	85
1	47	14	19	0	61	22	13	8	54	16	12	6
2	NA	23	2	0	NA	9	7	0	NA	18	4	1
3	NA	NA	8	0	NA	NA	3	0	NA	NA	6	0
4+	NA	NA	0	0	NA	NA	0	12	NA	NA	4	8

Source: NRDP employee workplace survey; results rounded to nearest percent; values less than .5% listed as zero.

Table 4-13). This percentage increased to 82 percent for three-person carpools, to 83 percent for four- to six-person carpools, and to 89 percent for vanpools. In 77 percent of vanpools, five or more commuter participants worked for the same employer.

Survey questions related to carpool formation patterns showed that the overwhelming majority of ridesharing arrangements at most sites resulted from informal contact at work or from household members' deciding to commute together. However, the method of formation varied by carpool size, with the largest and smallest carpools demonstrating very different formation characteristics, as shown in Table 4-14. Most two-person carpools were formed by household members or informal contact at work, while most vanpools (carpools with more than six persons) were formed at work. Formal mechanisms such as company newsletters and matching lists were used more widely by members of the largest carpools than by those in the smallest ones.

These results have important implications for rideshare marketing. If over 60 percent of carpoolers (five-site average) are in two-person carpools, and more than 50 percent of two-person carpooling (five-site average) is done by family members, it is likely that a substantial portion of carpooling arrangements will continue to be made at home, and not by rideshare assistance at the work place. In addition, a large percentage of persons who might be disposed to rideshare are family members who already rideshare in two-person carpools, which limits the potential market for ridesharing development through employers. At the same time, because carpool size increases with firm size, and larger carpools are more likely to be formed by fellow workers, a much higher proportion of carpoolers at large firms than small firms can be

Table 4-13.

DISTRIBUTION OF NUMBER OF OTHER CARPOOL MEMBERS WORKING FOR THE SAME EMPLOYER BY CARPOOL SIZE
(%)

	Atlanta				Cincinnati				Houston			
Carpool size:	2	3	4-6	7+	2	3	4-6	7+	2	3	4-6	7+
Other members working for same employer												
0	29	35	7	18	41	21	23	4	52	18	15	6
1	71	9	4	15	59	12	4	6	48	13	9	2
2	NA	56	5	14	NA	67	5	0	NA	69	1	1
3	NA	NA	27	3	NA	NA	58	0	NA	NA	55	0
4+	NA	NA	57	50	NA	NA	10	90	NA	NA	20	91
	100	100	100	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace surveys.

Table 4-13, (cont.)

DISTRIBUTION OF NUMBER OF OTHER CARPOOL MEMBERS
WORKING FOR THE SAME EMPLOYER BY CARPOOL SIZE
(%)

	Portland				Seattle				Five-Site Average			
Carpool size:	2	3	4-6	7+	2	3	4-6	7+	2	3	4-6	7+
Other members working for same employer												
0	41	20	27	6	56	19	13	23	44	22	17	11
1	59	15	7	0	44	28	13	17	56	16	7	8
2	NA	65	7	0	NA	53	3	0	NA	62	4	3
3	NA	NA	59	0	NA	NA	51	0	NA	NA	50	1
4+	NA	NA	0	94	NA	NA	20	60	NA	NA	22	77
	100	100	100	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace surveys.

Table 4-14.

DISTRIBUTION OF CARPOOLERS BY METHOD OF CARPOOL FORMATION
FOR SELECTED-SIZE CAR- OR VANPOOLS
(%)

	Atlanta			Cincinnati			Houston		
Carpool size:	All	>6	2	All	>6	2	All	>6	2
How formed									
Household	40	17	44	40	0	52	31	1	58
Neighborhood	8	0	10	7	4	5	6	1	6
Informal work contact	48	45	45	46	56	38	37	13	34
Firm newsletter	1	2	0	2	32	1	13	46	1
Firm matching	2	0	0	2	8	0	12	37	1
Rideshare program	1	8	1	1	0	0	0	0	0
Newspaper ad	1	28	0	0	0	0	0	0	0
Other	0	0	0	3	0	3	1	2	0
	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace survey; results rounded to nearest percent; values less than .5 percent listed as zero.

Table 4-14, (cont.)

DISTRIBUTION OF CARPOOLERS BY METHOD OF CARPOOL FORMATION
FOR SELECTED-SIZE CAR- OR VANPOOLS
(%)

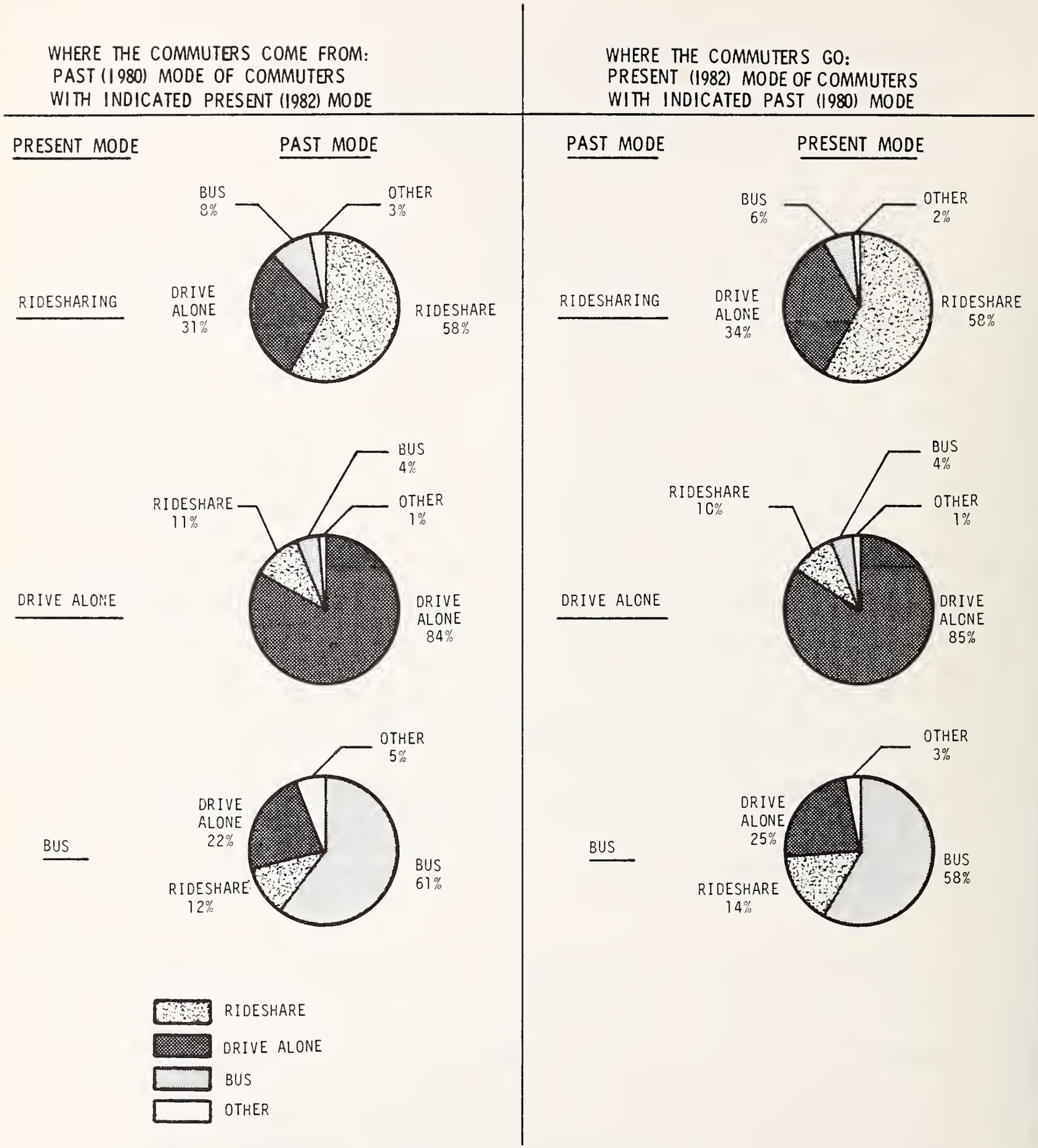
	Portland			Seattle			Five-Site Average		
Carpool size:	All	>6	2	All	>6	2	All	>6	2
How formed									
Household	35	0	45	45	0	64	38	4	53
Neighborhood	5	0	5	8	0	9	7	1	7
Informal work contact	54	54	50	38	46	25	44	43	38
Firm newsletter	1	40	0	3	20	1	4	28	1
Firm matching	1	0	0	3	14	1	4	12	0
Rideshare program	4	6	0	3	16	1	2	6	0
Newspaper ad	0	0	0	0	0	0	0	6	0
Other	0	0	1	1	4	1	1	1	1
	100	100	100	100	100	100	100	100	100

Source: NRDP employee workplace survey; results rounded to nearest percent; values less than .5 percent listed as zero.

expected to make use of institutional assistance programs in making ridesharing arrangements. Thus, the findings generally support the large-firm emphasis of most employer-based rideshare marketing programs.

Evidence on the dynamics of ridesharing arrangements was obtained by comparing responses to questions about current mode choice with retrospective questions asking respondents to identify their primary mode of travel to work two years ago. These responses indicated a considerable amount of movement into and out of carpools and other modes over time, as shown in Figure 4-3. The amount of movement varied considerably by mode. For example, of those who were driving alone to work two years prior to the survey (1980), 85 percent were still driving alone at the time of the survey. By contrast, the percentage of employees carpooling two years earlier who were still carpooling in 1982 was much lower--58 percent. The retention rate of transit riders was the same as that of carpoolers: 58 percent of those who were transit riders two years earlier were still transit riders at the time of the survey. (It is taken for granted that some commuters in all three groups may have moved out of and back into their current mode during the two-year period, but this does not affect the overall conclusions.)

Responses to the same set of questions provided evidence on the source of recruits to all three major transportation modes. Over 70 percent of new carpoolers (i.e., those carpooling in 1982 who were not carpoolers in 1980) formerly drove alone (.31/.42 = .71), and over 20 percent formerly used transit. The remaining new carpoolers included those who formerly walked, worked at home or took other modes. The recruitment process worked in several directions. About 65 percent of those new to the drive-alone mode had been



Source: NRDP employer and employee workplace survey

Figure 4-3.

MOVEMENT INTO AND OUT OF MODES: FIVE-SITE AVERAGE

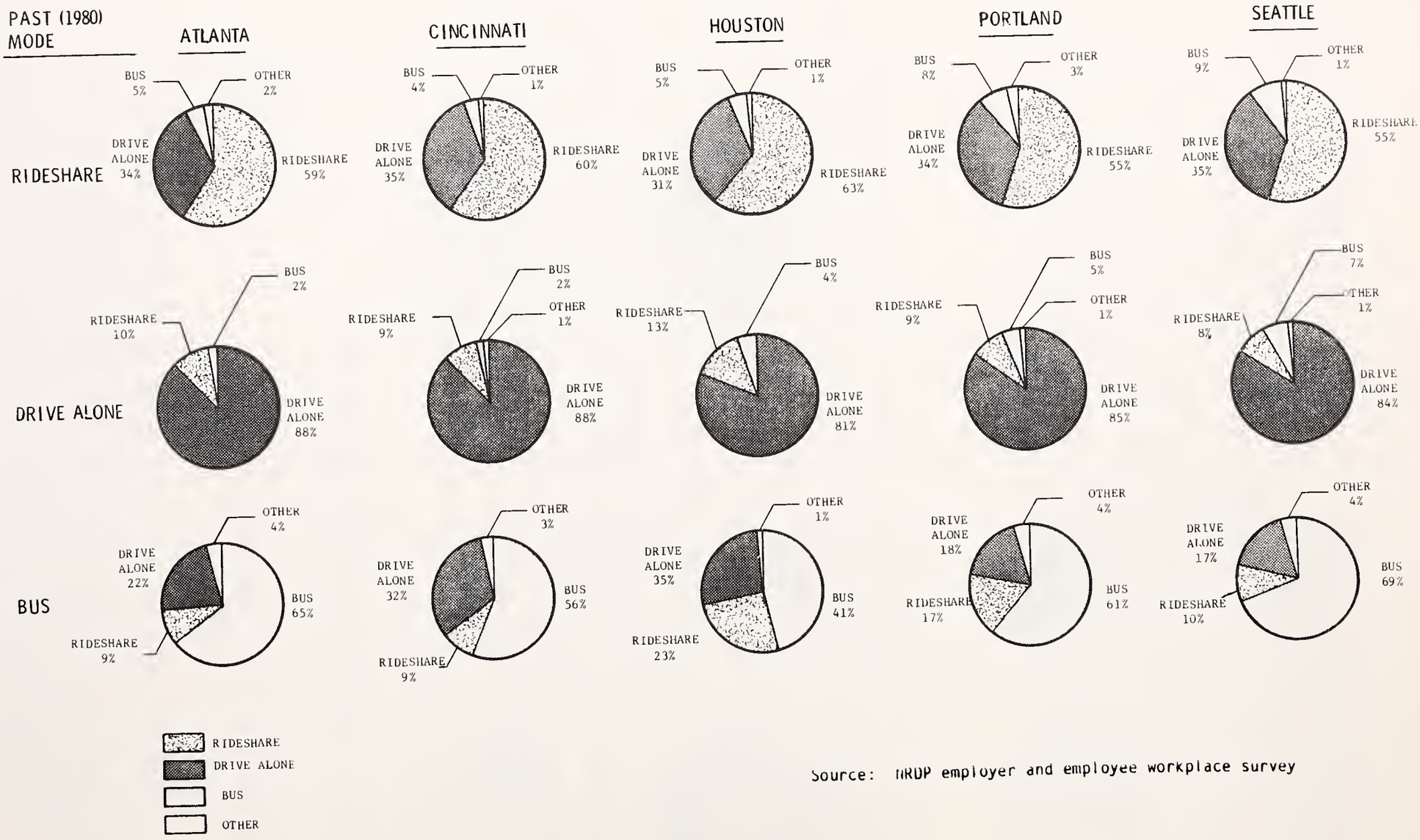
ridesharing two years ago, while 29 percent on average were former transit users. These findings suggest that rideshare programs should expect to exert continuous "carpool maintenance" efforts, both by finding replacement ridesharers and by encouraging current members to continue ridesharing. Because the drive-alone mode is so large--approximately 60 percent of all commuters--even a small increase in the percentage of those switching to drive-alone travel represents a substantial drain on ridesharing and transit mode shares.

The relative duration and stability of ridesharing and other modal commuting patterns were found to be remarkably similar across sites, as shown in Figure 4-4. Two exceptions were the patterns of transit use in Houston and Seattle. In Houston, fewer than half of those who were bus riders two years before the survey were still using the bus in 1982. A large percentage of these former bus patrons (23 percent) had become ridesharers. It is not clear what accounts for the low retention rate of bus riders in Houston, although a change in level of transit service relative to job growth is one possibility. By contrast, a higher than average portion of former bus riders in Seattle were still riders at the time of the survey--69 percent.

4.2 EMPLOYER INVOLVEMENT IN EMPLOYEE RIDESHARING

4.2.1 Characteristics of Surveyed Firms

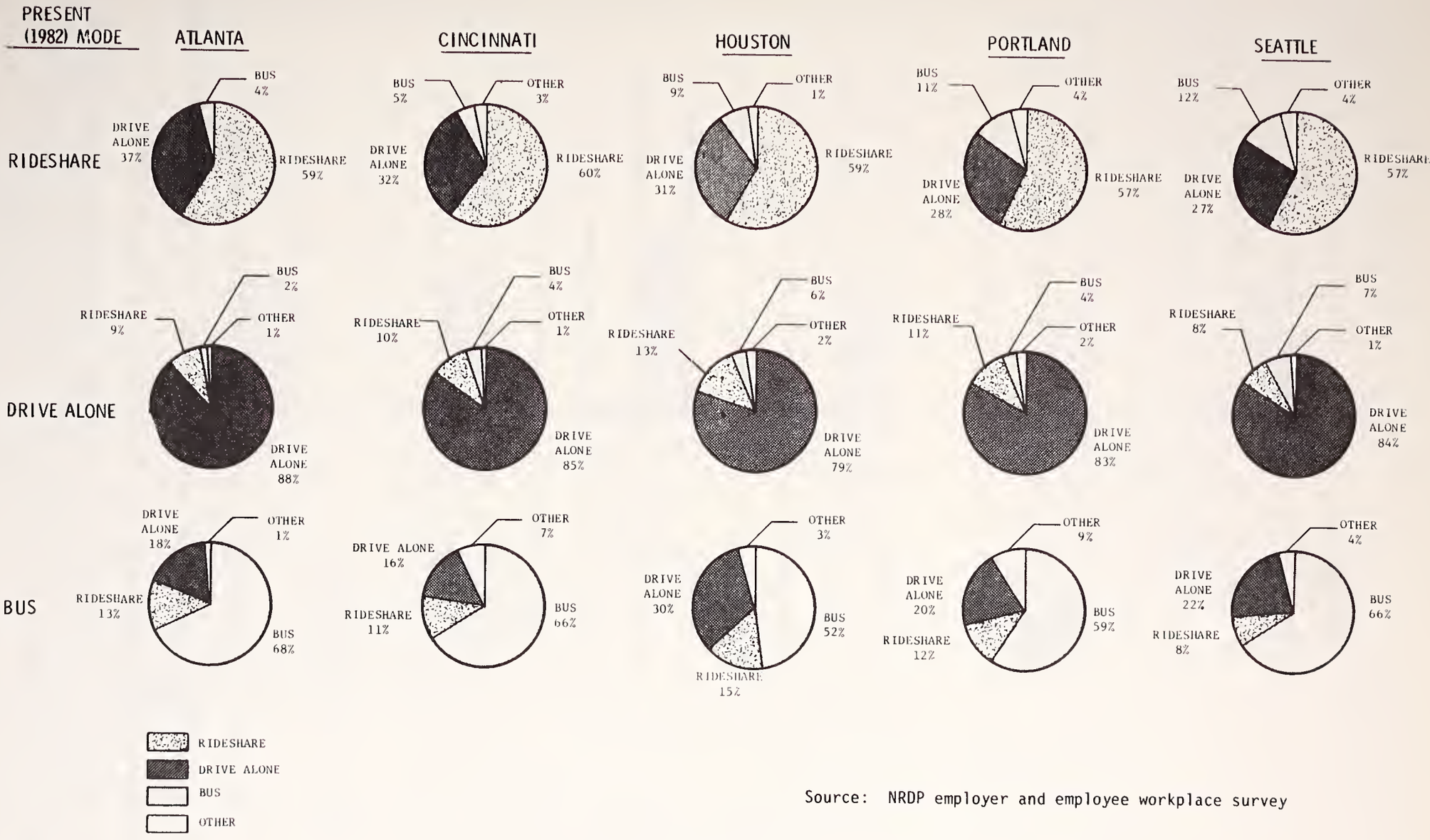
Survey results yielded a profile of firms in five metropolitan areas by size, type of business, type of schedule, parking availability, and length of time at current location. Most of the firms at each of the five sites were



Source: NRDP employer and employee workplace survey

Figure 4-4.

MOVEMENT INTO AND OUT OF MODES BY SITE



Source: NRDP employer and employee workplace survey

Figure 4-4, con't.

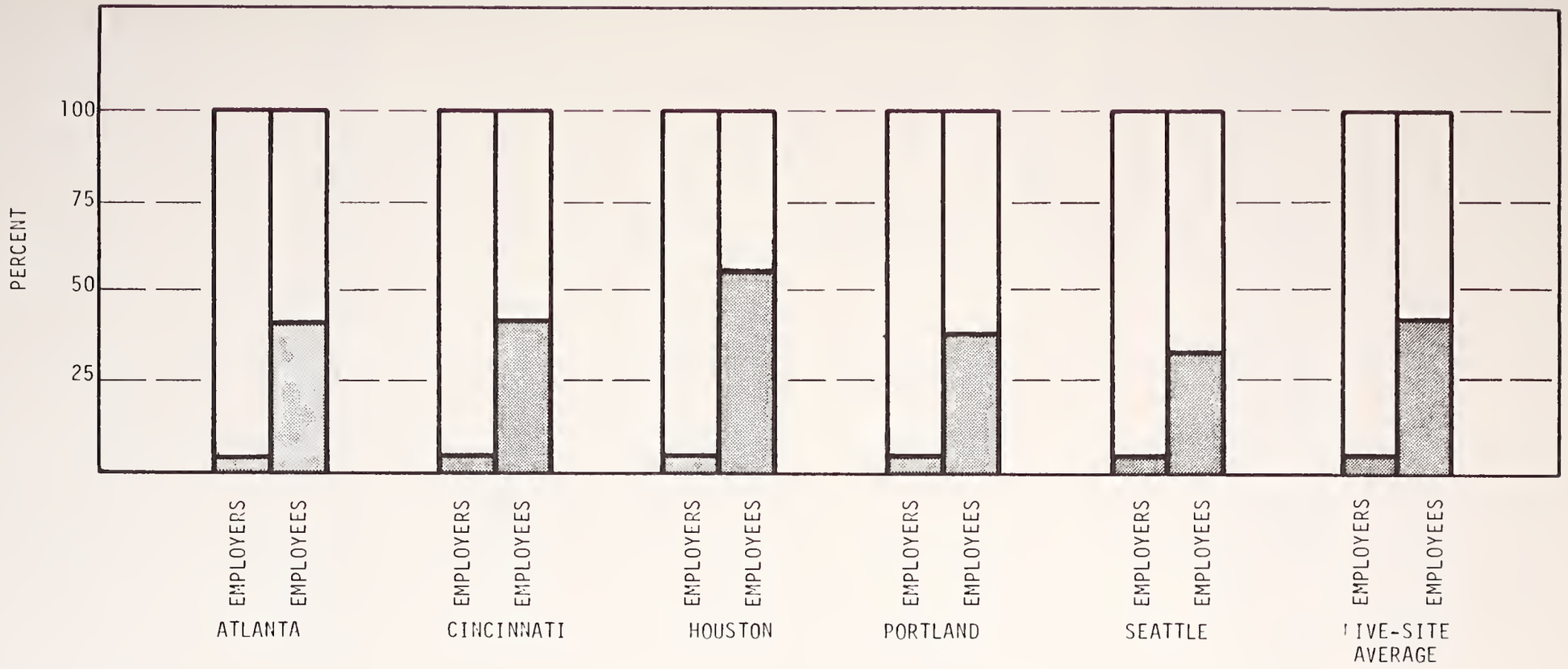
MOVEMENT INTO AND OUT OF MODES BY SITE

small enterprises. As shown in Figure 4-5, more than 95 percent of the firms had fewer than 100 employees. At the same time, larger firms accounted for more than one third of the employees at each site. The distribution of firm types varied from one site to another, but retail, manufacturing and business or commercial services were among the kinds of firms found most often at a majority of the sites, as shown in Table 4-15. A substantial majority of firm employees at the five sites had fixed work hours, as indicated in Table 4-16. Variations in the mix of schedule types differed between sites.

Free (non-employer-provided) parking was available within a quarter mile of the work site at most firms, and at many of these sites employers provided their own employee parking in addition. Employers showed wide variation in their tendency to provide free parking for employees, if parking was not available, as shown in Table 4-17. At all sites except Houston, over 40 percent of the firms had been at their current location more than 10 years. At all sites, over one third of the firms had been at the same location between four and 10 years. Firms newly arrived in the past four years constituted less than one fourth of all firms at every site except Houston, which is not surprising, given the area's rapid growth in recent years.

4.2.2 Transportation Assistance

As a first step, the proportion of firms offering transportation assistance of any sort to employees was calculated. It was decided to examine the relationship between employee mode choice and the amount and kind of assistance offered by his employer, particularly ridesharing assistance. It was found that, on average, most firms did not offer any transportation



Source: NRDP employer and employee workplace survey

Figure 4-5.
SMALL AND LARGE FIRM SHARE OF ALL AREA FIRMS AND ALL AREA EMPLOYEES

Table 4-15.

DISTRIBUTION OF FIRMS BY TYPE OF BUSINESS
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Type of business						
manufacturing	7	14	17	18	7	12
retail	19	28	15	28	8	20
wholesale	8	6	8	7	16	9
services:						
financial	7	5	15	7	13	9
legal	0	0	6	0	4	2
business	14	15	21	9	11	14
commercial	13	14	1	6	11	9
health & social	9	8	1	9	12	8
transportation/ utilities	6	3	8	7	5	6
education	5	5	1	5	0	3
government	6	0	0	1	12	4
other	6	2	8	3	1	4
	100	100	100	100	100	100

Source: NRDP employer workplace survey; results rounded to nearest percent; values less than .5% listed as zero.

Table 4-16.

DISTRIBUTION OF EMPLOYEES BY TYPE OF WORK SCHEDULE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Type of schedule						
fixed hours	74	73	70	70	65	70
fixed start only	7	7	12	9	9	9
varied start	5	7	7	8	12	8
irregular	12	11	10	12	11	11
rotating shift	2	2	1	1	3	2
	100	100	100	100	100	100

Source: NRDP employee workplace survey.

Table 4-17.

DISTRIBUTION OF FIRMS BY PROVISION AND/OR AVAILABILITY OF FREE PARKING WITHIN .25 MILES OF WORK SITE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Provided by employer and available free*	31	41	66	60	40	48
Provided by employer and not available free*	10	33	24	6	19	18
Not provided by employer but available free*	50	23	11	29	23	27
Not provided by employer and not available free*	9	3	0	5	18	7
	100	100	100	100	100	100

*"Provided by employer" refers to parking provided by employers, usually at no cost. It includes parking provided for all employees as well as parking provided for some employees only. "Available" refers to non-employer-provided free parking found within 0.25 miles of workplace.

Source: NRDP employer workplace survey; results rounded to nearest percent; values less than .5% listed as zero.

assistance to their employees. The proportion of firms offering assistance ranged from 16 percent in Atlanta to 50 percent in Cincinnati and Seattle, as shown in Table 4-18. Of those offering transportation assistance, fewer than one third offered ridesharing assistance, defined here as carpool formation assistance, ridesharing incentives such as preferred parking, and vanpool transportation. At every site, a majority of employers offering ridesharing assistance stated that the benefits of employer-sponsored ridesharing outweighed the costs, as shown in Table 4-19. At the same time, for all sites except Houston, employers not providing ridesharing assistance were much less likely to view such assistance as beneficial.

Ridesharing assistance was found to be highly correlated with firm size, as shown in Table 4-20. At large firms, employees were more likely to rideshare, carpools were apt to be larger, and employees were more likely to use firm assistance in forming carpools. Because the firms which offer rideshare assistance are large, the aid they offer can reach a large number of employees. It follows that such firms will be more efficient settings for reaching the employee ridesharing market, in terms of numbers and concentration of workers. In addition, large firms would likely be more amenable to offering ridesharing assistance to their employees.

The share of employees ridesharing to work was found to be higher at those firms offering "active" ridesharing assistance than at other firms, as shown in Table 4-21. "Active" and "passive" assistance were defined to include all help in joining or forming a carpool, and the two categories differed only in the degree to which an employer committed resources to the effort. For example, "active" assistance included provision of vans, special

Table 4-18.

DISTRIBUTION OF FIRMS BY PROVISION OF TRANSPORTATION ASSISTANCE

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Transportation assistance:	16	50	22	37	50	35
ridesharing	2	5	2	5	12	5
non-ridesharing	14	45	20	32	38	30
No transportation assistance	84	50	78	63	50	65
	100	100	100	100	100	100

Source: NRDP employer workplace survey.

Table 4-19.

PROPORTION OF EMPLOYERS STATING THAT BENEFITS
OF EMPLOYER-PROVIDED RIDESHARING ASSISTANCE OUTWEIGH COSTS
BY WHETHER EMPLOYER PROVIDES SUCH ASSISTANCE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
ridesharing assistance	86	69	86	74	57	74
no ridesharing assistance	26	34	57	10	14	28

Source: NRDP employer workplace survey.

Table 4-20.

PROPORTION OF LARGER AND SMALLER FIRMS OFFERING RIDESHARING ASSISTANCE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Larger* firms	21.2	31.9	38.2	38.1	54.8	36.8
Smaller* firms	1.0	2.4	1.9	5.1	9.7	4.0
All firms	1.4	3.2	2.9	5.8	10.5	4.8

*"Larger" firms have 100 or more employees, smaller firms fewer than 100 employees.

Source: NRDP employer workplace survey.

Table 4-21.

EMPLOYEE RIDESHARE MODE SPLIT AT FIRMS OFFERING VARIOUS TYPES OF TRANSPORTATION ASSISTANCE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
no assistance	18	16	24	14	13	17
non-RS* assistance	16	19	22	22	16	19
passive RS assistance	27	30	NA	21	19	24
active RS assistance	27	35	36	27	22	29
all firms	19	20	26	21	17	21

*"RS" refers to ridesharing; non-ridesharing assistance includes other forms of transportation assistance, such as transit pass sales or subsidies.

Source: NRDP employer and employee workplace survey.

incentives, in-house matching services, and employee get-togethers. "Passive" assistance included distribution of ridesharing brochures, display of posters, and general management encouragement of ridesharing.

Although active ridesharing assistance was associated with a higher ridesharing mode split, the direction of causality cannot be determined from the statistics shown in Table 4-21. While an active ridesharing assistance program may well induce some employees to rideshare, it may also be the result of employee demands. Because large firms offer assistance more often than smaller ones, the ridesharing mode split was examined for employees of firms in all four size categories, to see whether the type of ridesharing assistance was correlated with a higher rideshare mode split, across various firm sizes. As shown in Table 4-22, the type of ridesharing assistance offered does not appear to be associated with a higher proportion of ridesharing employees for most firm sizes. However, active ridesharing assistance is associated with a higher ridesharing mode split at the largest firms. One possible explanation is that ridesharing assistance is more strongly promoted at larger firms than at smaller firms, and thus is more productive in terms of inducing employees to rideshare.

Table 4-22.

EMPLOYEE RIDESHARE MODE SPLIT AT FIRMS OFFERING VARIOUS TYPES OF ASSISTANCE BY FIRM SIZE CATEGORY
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Firm Size						
1-19 employees						
no assistance	16	7	28	11	14	15
non-RS assistance	7	17	33	23	17	19
active RS assistance	NA	100	NA	17	3	40
passive RS assistance	NA	NA	NA	NA	NA	NA
20-99 employees						
no assistance	18	16	19	15	14	16
non-RS assistance	19	12	22	20	11	17
active RS assistance	20	NA	15	22	19	19
passive RS	NA	52	0	NA	19	24

Table 4-22, (cont.)

EMPLOYEE RIDESHARE MODE SPLIT AT FIRMS OFFERING VARIOUS TYPES OF ASSISTANCE BY FIRM SIZE CATEGORY
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Firm size						
100-499 employees						
no assistance	20	21	30	20	13	21
non-RS assistance	19	32	24	20	21	23
active RS assistance	21	25	29	28	24	25
passive RS assistance	12	22	NA	21	26	20
>499 employees						
no assistance	22	25	8	19	22	19
non-RS assistance	15	31	22	17	6	18
active RS assistance	34	35	42	32	27	34
passive RS assistance	30	22	NA	21	26	25

Source: NRDP employer and employee workplace survey.

5. EFFECTIVENESS OF THE DEMONSTRATION PROJECTS

5.1 ESTIMATING THE IMPACT OF THE DEMONSTRATIONS

Measuring the impact of the ridesharing demonstration projects requires determining whether ridesharing participation in 1982 on the part of firms or individuals was different from what it would have been without the efforts of local ridesharing programs during the two prior years. Chapter 4, Table 4-1, showed no significant change in mode split from 1980 to 1982. However, it is still possible that ridesharing would have declined without the programs.

For a variety of reasons, including inadequacies in experimental and project design, it is hard to make an assessment of demonstration project impacts. In the first place, no "before" surveys were taken against which change could be measured, although this was partially compensated for by the inclusion of retrospective questions in the employee survey. In addition, demonstration proposals were funded which were unlikely to yield clear-cut results. For example, while innovation was a goal of many projects, it did not always materialize. Most projects did not represent entirely new directions, making it extremely difficult to isolate and assess the effectiveness of the techniques and strategies being used. Many projects had numerous demonstration elements, further complicating the evaluation environment. The lack of a formal project startup time at many sites and the fact that funding dollars from different sources could be mixed together increased the difficulty of attributing any change in the level of ridesharing

to an activity specifically funded by the NRDP. Finally, the gasoline shortage of 1979 undoubtedly affected commuter ridesharing decisions, but no attempt was made in this study to estimate the extent of its influence.

For the evaluation itself, TSC's adoption of a uniform workplace survey instrument simplified the task of comparing firm and individual ridesharing behavior across sites, but only partially compensated for the complexity of the demonstration project design. In some ways, it complicated matters. The basic survey results (i.e., changes in ridesharing participation as a result of the program) were supposed to be related to demonstration efforts, but the survey took no note of individual project elements, which varied from site to site. Changes in behavior had to be attributed to generalized marketing efforts ("contact") by the ridesharing agency. However, lack of a clear-cut definition for this term (it would have had to vary from site to site) made interpretation of survey results difficult. Finally, it is likely that ridesharing agencies contacted the most promising firms more frequently than others, but the amount of this difference could not be measured, which precluded more rigorous assessment of demonstration impacts.

5.2 RIDESHARING PROGRAM MARKETING TO EMPLOYERS

While no definitive conclusions can be drawn from the survey results about the impact of local ridesharing programs on ridesharing behavior, there is evidence for characterizing program effectiveness. Most of this evidence involves comparing ridesharing program marketing or contact with firms with employee choice of transportation mode at those firms. Quantitative analysis is necessarily limited to the five surveyed case study sites. Additional

evidence from evaluation reports on the remaining case study sites is later used to assess the effectiveness of project elements and techniques other than generalized employer-based marketing efforts.

5.2.1 Marketing Contact with Firms

Marketing efforts were defined to include both contact of firms by the area ridesharing program as well as successful attempts by firms to receive ridesharing information and/or aid from the ridesharing program. In other words, "contact" could work in either direction. (Being contacted, in the sense of being asked to participate in the workplace survey, was not part of the marketing effort that is referred to here.)

At all five sites, only a very small percentage of all firms had contact with the ridesharing program, as shown in Table 5-1. Large firms were more likely than small firms to be in contact with the local ridesharing program. However, most firms are small firms, as seen earlier in Figure 4-5. Thus, while the percent of firms in contact with ridesharing programs was found to be small, the percent of employees at those contacted firms was considerably higher, as seen in Figure 5-1.

In spite of the large numbers of employees theoretically exposed to ridesharing marketing efforts (i.e., working at contacted firms), the percent actually receiving ridesharing materials was quite a bit lower. Even at firms which reported receiving ridesharing materials or assistance, only between 14 and 30 percent of employees also reported receiving such assistance, as seen in Table 5-2. Interestingly, between three and 11 percent of employees at

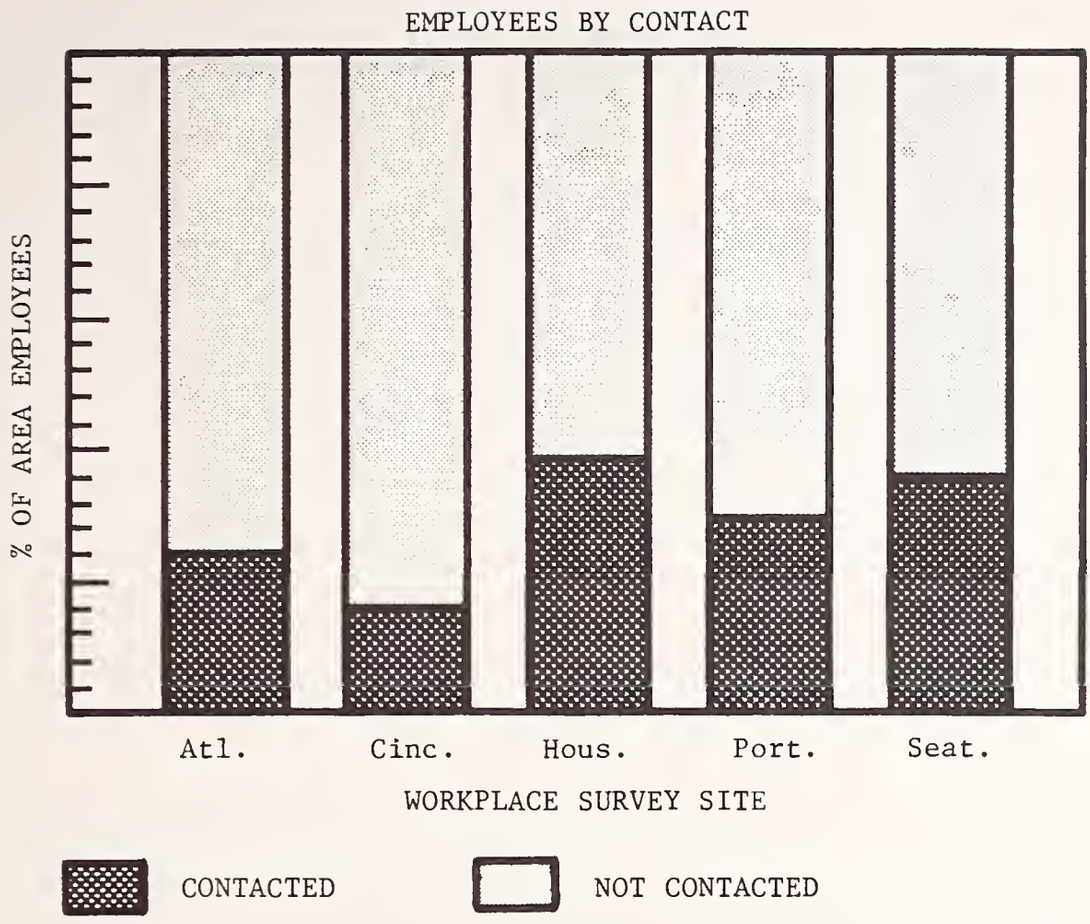
Table 5-1.

PROPORTION OF LARGER AND SMALLER FIRMS HAVING CONTACT WITH RIDESHARING PROGRAM
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Larger* firms	25	23	39	48	61	39
Smaller* firms	7	4	7	7	11	7
All firms	8	5	8	8	12	8

*Larger firms have 100 or more employees; smaller firms have fewer than 100 employees.

Source: NRDP employer workplace survey.



Source: NRDP employer and employee workplace survey

Figure 5-1.

PERCENTAGE OF ALL AREA EMPLOYEES IN FIRMS HAVING CONTACT WITH RIDESHARING PROGRAM.

Table 5-2

PERCENT OF EMPLOYEES RECEIVING RIDESHARING MATERIALS OR ASSISTANCE FROM AREA RIDESHARING PROGRAM BY WHETHER EMPLOYER RECEIVED SUCH ASSISTANCE (%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Employer received assistance	21	22	23	14	30	22
Employer did not receive assistance	3	5	10	7	11	7

Source: NRDP employer and employee workplace survey.

firms which did not receive ridesharing materials and assistance reported receiving such assistance themselves. Looked at from the employees' perspective, about half of those receiving ridesharing assistance at four of the sites worked for firms which had not received ridesharing assistance, as shown in Table 5-3. It is not clear how these employees obtained ridesharing assistance, but one could speculate on the sources, such as by reading bulletin boards at work or by personally contacting a ridesharing program, or from exposure to various media, such as billboard, radio or television promotions of ridesharing. The fact that such a high percentage of employees receiving assistance were working at firms not in contact with the ridesharing program is evidence that the reach of many ridesharing programs extends beyond the firms on which they focus.

5.2.2. Impact on Mode Choice

For those firms which were in contact with the local ridesharing program, the percentage of employees ridesharing was significantly higher at all sites than it was for those firms which were not in contact, as shown in Table 5-4. As with assistance, however, the direction of causality cannot be deduced from these statistics alone. That is, we cannot say for certain that contact increased ridesharing. The programs may have tended to contact firms which already offered ridesharing assistance, which is itself associated with a higher ridesharing mode split. Table 5-5 shows the proportion of contacted and not contacted larger firms which offered ridesharing assistance. (Too few small firms both offer assistance and were contacted to be listed.) It is apparent that assistance was much more likely to be found at contacted firms, particularly in Houston and Seattle. There is no way to know, however,

Table 5-3.

DISTRIBUTION OF EMPLOYEES RECEIVING RIDESHARING PROGRAM MATERIALS OR ASSISTANCE BY WHETHER EMPLOYER RECEIVED SUCH ASSISTANCE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Employers received assistance	70	47	57	43	57	55
Employers did not receive assistance	30	53	43	57	43	45
	100	100	100	100	100	100

Source: NRDP employer and employee workplace survey.

Table 5-4.

EMPLOYEE RIDESHARE MODE SPLIT BY FIRM CONTACT WITH RIDESHARING PROGRAM
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Firms with contact	24	26	36	25	21	26
Firms without contact	17	18	24	17	14	18
All firms	19	20	28	19	16	20

Source: NRDP employer and employee workplace survey.

Table 5-5.

PERCENT OF CONTACTED AND NON-CONTACTED LARGER FIRMS
OFFERING RIDESHARING ASSISTANCE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Larger firms with contact	57	51	70	53	66	59
Larger firms without contact	9	26	18	24	38	23
All large firms	21	32	38	38	55	37

Source: NRDP employer workplace survey.

whether or not a firm's assistance pre-dated its contact with the local ridesharing program, because the workplace survey did not ask firms when their contact with the ridesharing program began.

The population of employees was divided according to whether their firm had been contacted and whether it offered ridesharing assistance. The ridesharing mode splits for the four groups were then compared. If contact made a difference in mode split at both firms offering ridesharing assistance and those not, it would be a more valid indication of program effectiveness. Results were mixed, as shown in Table 5-6. For firms which did offer ridesharing assistance, contact was associated with a significantly higher mode split at three sites--Atlanta, Houston, and Seattle. Little difference was seen in the ridesharing mode split of employees at contacted versus non-contacted firms which did not offer ridesharing assistance, except in Portland, where a higher rideshare mode split was associated with contacted firms.

It was hypothesized that firm size, which was itself associated with more firm contact, might account for the higher ridesharing mode split at contacted firms observed in Atlanta, Houston, and Seattle. Further analysis of the data, controlling for firm size, showed this was the case in Houston. However, in Atlanta and Seattle, the ridesharing mode split was higher for all contacted firms offering assistance, regardless of size. No causality can be inferred, in part because the order of contact and assistance are not known, but the results suggest that contact with the ridesharing program may enhance the effect of a firm's ongoing ridesharing efforts, at least in Atlanta and Seattle.

Table 5-6.

EMPLOYEE RIDESHARE MODE SPLIT BY FIRM CONTACT WITH RIDESHARE PROGRAM AT FIRMS WHICH DO AND DO NOT OFFER RIDESHARING ASSISTANCE
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Firms offer active ridesharing assistance						
firm contact	31	33	38	29	26	31
no firm contact	18	38	28	25	13	24
Firms do not offer active ridesharing assistance						
contact	19	16	23	21	14	19
no contact	17	17	24	16	14	18

Source: NRDP employer and employee workplace survey.

The effect of the ridesharing program on employee behavior was also examined by looking at how useful employees had found the ridesharing program to be. The vast majority of employees at all five sites received no assistance at all from the ridesharing program, as shown in Table 5-7, a result consistent with the finding observed earlier, that only a small percentage of all employees received materials or assistance from the ridesharing program. An additional group of employees received aid, but did not use it, for whatever reason, as also shown in Table 5-7. A third group stated that they were helped to form or join a carpool by the ridesharing program, again shown in Table 5-7. This is perhaps the best evidence available of the scale of impact from the ridesharing programs. It suggests that between 0.4 and 1.2 percent of all employees at each site, or between about 2,100 and 17,000 employees, had found the ridesharing program of direct help to them in getting started with ridesharing.

When the question was limited to ridesharing employees, it appeared that between 2.2 and 5.3 percent of current carpoolers, or a range of between 2,400 and 16,000 employees per site, had found the ridesharing program of direct help, as shown in Table 5-8. Further, the ridesharing employees helped by the program included employees at firms which had not been contacted by a ridesharing program, as shown also in Table 5-8. These employees were probably helped by general marketing efforts of their local ridesharing programs, such as billboards, posters or other advertisements. At most sites, about 65 percent of all carpoolers who were helped by the ridesharing program to begin carpooling joined a new carpool, as opposed to a pre-existing one, as shown in Table 5-9.

Table 5-7.

DISTRIBUTION OF ALL AREA EMPLOYEES BY USE OF ASSISTANCE RECEIVED FROM RIDESHARING PROGRAM
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
Assistance helped in carpooling	0.5	1.2	1.2	0.4	1.2	0.9
Assistance not used or unsuccessful	6.6	16.3	14.6	8.9	16.3	12.5
No assistance received	92.9	82.5	84.2	90.7	82.5	86.6
	100.0	100.0	100.0	100.0	100.0	100.0

Source: NRDP employee workplace survey.

Table 5-8.

PROPORTION OF CURRENT CARPOOLERS DIRECTLY HELPED BY RIDESHARING PROGRAM AT ALL FIRMS AND NON-CONTACTED FIRMS
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
All firms						
aid helped employee to carpool	2.2	2.2	3.9	2.2	5.3	3.2
Non-contacted firms						
aid helped employee to carpool	0.3	0.7	0.6	0.2	0.5	0.5

Source: NRDP employer and employee workplace survey.

Table 5-9.

DISTRIBUTION OF CARPOOLERS ASSISTED BY THE RIDESHARE PROGRAM BY WHETHER THE CARPOOLS THEY WERE HELPED TO JOIN WERE PRE-EXISTING OR NEW
(%)

	Atlanta	Cincinnati	Houston	Portland	Seattle	Five-Site Average
New carpool	85	60	69	47	64	65
Pre-existing carpool	15	40	31	53	36	35
	100	100	100	100	100	100

Source: NRDP employee workplace survey.

The results in Table 5-8 are consistent with those previously presented in Figure 4-14. According to Table 5-8, on average, 3.2 percent of current carpoolers had found their area ridesharing program of direct help in getting started with carpooling, while Figure 4-14 indicated that about two percent of current carpoolers identified their area ridesharing program as the primary means by which they joined or formed their carpool. These figures, however, likely represent a lower bound for the impacts of local ridesharing programs. Assistance to employees was often channeled through employers, as many ridesharing programs consciously strove to transfer responsibility for such assistance to the firms. Such policies, in turn, could have caused employees to perceive rideshare marketing efforts as coming from their firms, rather than from the area ridesharing programs which had initiated the assistance. Thus, employees would have underestimated the impact of the ridesharing programs on their own travel decisions.

5.3 EFFECTIVENESS OF OTHER PROJECT STRATEGIES

While no uniform survey was taken to estimate the effectiveness of various ridesharing program techniques, TSC's eight case study evaluation reports offer considerable anecdotal evidence of the merits of various strategies, which are discussed below.

5.3.1 Neighborhood and Regional Marketing

Neighborhood marketing of ridesharing refers to promotion of the ridesharing mode--and possibly specific ridesharing services--to individual

households, for both commuting and non-commuting purposes. It is also known as community-based or home-end marketing. This technique was the principal element in the Lincoln ridesharing demonstration project and one of several elements in the Cincinnati demonstration. Neighborhood marketing was also among the elements planned in several projects which were incomplete at the end of the demonstration period.

While neither the Lincoln nor Cincinnati demonstration offered conclusive evidence of the value of neighborhood marketing, each gave a strong indication that this approach is less useful than employer-based approaches. In the case of Lincoln, no difference was observed in the use of alternative travel modes by households receiving personalized ridesharing services from neighborhood representatives versus control households. Community ridesharing efforts in Cincinnati yielded little increase in the amount of ridesharing and none which could be definitively linked to rideshare program marketing efforts.

Regional marketing of ridesharing showed promising results both in North Carolina and in Cincinnati. Regional marketing refers to promotional strategies aimed at the general commuter market in a specific region. Advertising and promotion of ridesharing was a principal element in the North Carolina demonstration. Highway signs and billboards were shown to be among the most useful techniques for raising public awareness of ridesharing. Freeway signs and a ridesharing information phone number were also used by the project to promote ridesharing to regional commuters. About 50 percent of the non-work-based matching applicants learned of the program from freeway signs.

Among the difficulties associated with evaluating both neighborhood and regional rideshare marketing were insufficient controlled data collection efforts before and after promotional campaigns to measure observed changes in ridesharing behavior and attribute them to project advertising efforts.

5.3.2 Institutional and Environmental Changes

Demonstrations in Seattle and Portland were the major sites for development of institutional and environmental changes to encourage increased ridesharing participation. Seattle systematically identified 55 incentives to ridesharing. The project obtained an amendment to the zoning code in the City of Bellevue, reducing the required minimum number of parking spaces in exchange for a developer's agreement to promote ridesharing programs. The demonstration in Seattle drafted and successfully lobbied for passage of legislation exempting certain vanpool vehicles from retail sales and motor vehicle excise taxes. Analysis of institutional barriers and incentives was part of the Portland ridesharing project, which supported legislation to eliminate various restrictions on vanpool operations. The legislation was adopted by the state's 1981 legislative session.

No conclusive evidence was available from the demonstrations linking legislative changes with increased vanpooling, however. Neither project was able to obtain passage of additional legislative proposals which would have provided financial incentives for ridesharing, such as tax credits or tax deductions, due to a poor economy and unwillingness of the states to forgo needed revenue.

5.3.3 Development of New Services

New services developed in the course of the demonstrations included vanpool, shuttle bus, and shared-ride taxi services. Vanpool promotion was a major element in the Seattle, Houston, and Portland projects. Seattle promoted shared use of vanpool vehicles by social service agencies and commuters. By the end of the project, the shared-use fleet had expanded, although by fewer vehicles than originally projected. Third-party vanpool programs in Houston showed modest growth, which varied from one employment site (or activity center) to another. These vanpools faced competition from employer-operated vanpool programs already operating in the same region. The Portland demonstration included direct mailing of vanpool promotional materials to 20,000 registered van owners. About 600 van owners responded with requests for a vanpool information kit as a result of the promotional mailing. However, a follow-up survey showed that, at most, only between 15 and 18 owners had begun vanpooling as a result of the program.

Shuttle bus service was part of the Tidewater demonstration project. This project began a downtown shuttle bus service which was deemed a very effective operation, based on ridership data. The shuttle bus operation was taken over by the City of Norfolk five months after it started. Other alternatives to conventional fixed-route transit were tried in Tidewater, with varying degrees of success, and all of the results are well documented in terms of ridership, cost and revenue. Among the most promising replacements for bus service in low- and medium-density areas was a jitney-type service, one using small vehicles operating over a fixed route.

The jitney service operated at a lower per-passenger cost than that of the conventional service it replaced, making it an attractive alternative. Although the per-passenger cost of most other alternative services was higher than that of the conventional bus service being replaced, the total cost of the replacement services was still lower, because they were "leaner" services in terms of hours of operation. The jitney and other small-vehicle services appear to be useful options for transit systems to consider if they are faced with a need to reduce expenditures without eliminating service in an area served by conventional transit. Introduction of the alternative service was made more acceptable to riders through the use of preparatory marketing.

5.3.4 Other Employment-Based Techniques

The ridesharing programs used a wide variety of techniques to promote ridesharing at various firm and employment sites. Techniques included use of transportation coordinators, computer matching, activity (employment) centers, and workshops. No demonstration, however, undertook data collection rigorous enough to prove the relative merits of any one technique versus others. Therefore, little can be definitively said about any one element. Because few of the techniques are truly innovative, and many have been in use for some time, no additional assessment of them is made here, with the exception of computer matching services. Information on the process of organizing and using other strategies such as coordinators or employment centers can be found in evaluation reports for the relevant individual demonstrations, as described in the Appendix A profiles.

The use of computers for matching potential carpoolers is now routine in ridesharing operations. However, little hard evidence exists on the cost-effectiveness of computerized processing versus manual matching techniques. Bonsall et al., for example, cite a 1981 study suggesting that manual techniques produce higher quality match lists than an advanced computer matching system, because the computer method was not sensitive to peculiarities of the road network (11: p. 31). (Manual methods, of course, have physical limitations for large-scale programs.) The Houston ridesharing demonstration involved a change from a keypunch, batch-oriented system to on-line processing using CRT terminals. According to project staff, advantages of the new system included reduction in response time from two weeks to overnight (or less), increased processing capacity, reduction in data entry staff requirements, access to a central data base from remote (employment center) locations, and the ability to produce "company only" matches as well as matches for a single person rather than waiting for a minimum number of applicants for a batch run. No information on the cost-effectiveness of the Houston system or the improvement in list quality was obtained from the demonstration, however.

6. CONCLUSIONS

The cross-cutting study of the NRDP projects suggests conclusions in two general areas: those relating to issues which recur in ridesharing program design and operation, and those relating to issues of evaluation and research.

6.1 RECURRENT RIDESHARING ISSUES

Four categories of conclusions regarding ridesharing program design and operation can be drawn from results of the cross-cutting analysis:

- who the ridesharers are;
- how carpool arrangements work;
- what the relationship is between firms and ridesharing; and
- what the effect of ridesharing programs is on ridesharing behavior.

6.1.1 Ridesharer Characteristics

Evidence from the NRDP projects showed that carpoolers were more likely than other commuters to have more than zero and less than one automobile per employed worker in their households. Ridesharers were also found to be more likely to have a longer average journey to work than other commuters. These findings imply that the market for ridesharing is among those workers facing relatively long commutes whose households have a car, but who share it among more than one worker. One implication is that useful promotional approaches could stress the reduction (but not elimination) of car ownership costs from a

shared-driving arrangement, e.g., from eliminating the need for a second car, because cost savings is an important motive for ridesharing.

Survey results showed that women do more ridesharing than men, and that they more frequently serve as carpool passengers than drivers. No clear-cut relationship emerged between age or income and propensity to rideshare.

6.1.2 Carpool Arrangements

An overwhelming majority of carpools were found to be formed by household members or by informal work contact. In addition, a majority of carpools were found to consist of two-person arrangements. Fifty-one percent of these two-person carpools consisted of persons from the same household commuting together. It is reasonable to conclude that many existing and potential carpoolers would not be receptive to marketing by conventional rideshare programs, because many carpools are idiosyncratic arrangements, arrived at after family deliberations, and probably subject to considerable modification on a day-to-day basis. As a marketing approach, then, home-end ridesharing appears to be a less useful strategy than employment-centered or regional programs.

Analysis of movement into and out of carpool arrangements showed an average (across-site) retention rate of 58 percent for ridesharing over a two-year period. That is, 58 percent of those ridesharing two years before the demonstration were still ridesharing at the time of the demonstration, though not necessarily in the same carpool. The same proportion of current ridesharers--about 58 percent--had been ridesharers two years before the

survey. Most of the movement into and out of carpools was found to be from the drive alone mode, with a small amount of diversion into and out of public transit. The findings suggest that if rideshare programs are undertaken they should be ongoing efforts, designed to encourage maintenance of existing carpool arrangements.

6.1.3 Firm Involvement

Many ridesharing characteristics were found to be associated with firm size. The rideshare mode split was higher at large firms (i.e., those with 100 or more employees), and carpool size was correlated with firm size as well. Large firms were also more apt to provide transportation assistance to their employees, and transportation assistance was associated with a higher ridesharing mode split. The findings suggest that rideshare programs should continue to focus efforts on large firms, both to initiate ridesharing programs and to sustain current efforts. Because of the large numbers of potential carpoolers at large firms, and also large firms' tendency to offer assistance (which is associated with a higher ridesharing mode split at larger firms), such firms are more likely to provide effective markets for employer-based ridesharing programs.

Flextime was not found to have any effect on ridesharing, one way or the other. Evidence linking carpool formation patterns by household members and co-workers with contrasting schedule types (fixed versus varied start and employee-set schedule) suggested an hypothesis to explain this seeming lack of effect. Flextime may well enhance the ability of persons living together but working at different firms to form carpools, but may inhibit the formation of

worker-formed carpools, thus producing little net effect. It is also possible that promotion of flextime at multi-employer sites, or as part of a rideshare promotional "package," would increase ridesharing, but these hypotheses could not be tested using NRDP data. Further research on this point would seem warranted.

The need to pay for parking at the work site was found to have little impact on rideshare mode split in cities with good transit service. Parking fees substantially increase the cost of driving alone, and, to a lesser extent, the cost of carpooling. Apparently, at sites where parking fees are required but transit service is good, the number of solo drivers deciding to rideshare just about offsets the number of ridesharers deciding to take transit. Conversely, where transit service is poor, the need to pay for parking tends to increase the rideshare mode split, as the number of solo drivers choosing to rideshare exceeds the number of ridesharers turning to transit.

6.1.4 Program Effect on Mode Split

Area ridesharing programs were found to have a small direct impact on the rideshare mode split, from evidence in the workplace survey. However, the indirect effect of the programs, which could not be measured, may be considerable. Between two and five percent of current carpoolers said they were helped to join, form or maintain their carpools by the ridesharing program. There are several reasons why this percentage likely represents a minimum number of workers. One possibility is that ridesharing programs affect most employee behavior indirectly--for example, by influencing firms to

set up transportation assistance for their employees. In such cases, employees may not perceive the assistance as initiated by the ridesharing program.

Another possibility is that rideshare program contact (i.e., marketing) is less widespread than generally assumed. Between nine and 17 percent of all employees surveyed received materials from the ridesharing program. Even at contacted firms, however, fewer than one third of employees reported receiving such material. Possibly more follow-up at firms is called for. Contact itself was found to be positively associated with a higher mode split at firms offering ridesharing assistance at three of the five sites, but to have no association with mode split at firms not offering ridesharing assistance. There may be an enhancement effect of rideshare marketing at firms which are predisposed because of size or work force commute distances to offer ridesharing assistance.

6.2 Research Recommendations

Many of the NRDP projects originally scheduled for evaluation did not get started during the demonstration period, for a variety of reasons, including insufficient management and funding resources, overly complicated or diffuse project design, as well as delay from Federal and other requirements and procedures. On the other hand, focused projects administered by agencies with ample resources and authority, if little actual ridesharing experience, as well as more complex projects managed by agencies with considerable ridesharing experience, were implemented in the allotted time frame. It would seem reasonable to take these factors into consideration in the design of

future demonstration projects. Ridesharing is not yet a neatly defined, well-established enterprise at most sites. Making it work often requires considerable initiative, perseverance and coordination. The two critical factors in designating demonstration sites would seem to be the choice of a recipient with proven management capabilities and the selection of a project design that matches the recipient's resources.

One useful area for further ridesharing research would seem to be the relationship between flextime and the rideshare mode split. In particular, it would be helpful to investigate whether or not the introduction of flextime by some firms at multi-employer work sites would increase ridesharing among workers at those sites. The expectation might be that flextime would facilitate ridesharing among such workers, allowing potential carpoolers to structure common starting and stopping times. A second area for possible research would be to document the effectiveness of various computerized matching devices versus more conventional matching approaches to ridesharing, or versus simple distribution of updated match lists.

Although most of the NRDP evaluation results focus on ways to improve ridesharing programs and participation, there remains a need for more fundamental research documenting the costs and benefits of ridesharing compared with the alternatives available. One assumption of this report is that ridesharing is an activity to be encouraged. Because the data for estimating program costs are incomplete, and also because it is not possible to attribute changes in ridesharing mode split to NRDP activities per se, it is not possible to connect ridesharing benefits with costs. It would be very helpful to know, from a societal perspective, what a policy decision in

support of ridesharing means, both in terms of what benefits are realized, what costs are incurred, and by whom. Based on the NRDP demonstration projects, it seems likely that ridesharing benefits and costs vary considerably from one site to another, and it would be useful to know which program and market characteristics affect ridesharing costs and benefits, and to what extent.

APPENDIX A

PROFILES OF 17 NRDP PROJECTS

NOTE: Project evaluation reports were the primary source documents for profile information. Project dates begin with receipt of NRDP funds and conclude with the end of the formal demonstration period in June 1982. This date is given in parenthesis if the project demonstration had not yet been concluded. The NRDP grant is the amount awarded, as reported by the FHWA, whether or not the funds were applied exclusively to the demonstration project. Goals include both goals and objectives, as they were stated or implied in the reports. Project elements are limited to major components of a demonstration. Local agencies include those directly involved in project implementation. Federal agencies are not listed but included primarily UMTA and the FHWA; in a few cases the Departments of Energy and Labor were peripherally involved. Specific project achievements are those for which evidence can be found in the reports. General problems and shortcomings were discussed anonymously in Chapter 3. Data collection plans were produced for all projects by TSC and its evaluation contractors, but the profiles summarize only data collection efforts actually undertaken, as described in post-demonstration reports and memos.

SITE: Atlanta, GA
PROJECT: Atlanta Ridesharing Demonstration
DATES: January 1980 - October 1981
GRANTEE: Georgia Department of Transportation
NRDP GRANT: $250,156
EVALUATION: Case study with workplace survey, report by Charles River Associates, May 1984

==========

Goals

Major goals of the Atlanta Ridesharing Demonstration were to reduce peak-hour congestion; reach 50% of all CBD employees with rideshare marketing; increase average vehicle occupancy from 1.2 to 1.4; lower mobile source pollution in the Atlanta region by 10%; and increase public awareness of ridesharing.

Elements

1. Ridesharing promotion to firms with more than 100 employees at one site
2. Rideshare promotion at multi-employer CBD work locations.

Special efforts were focused on increasing the use of park-and-ride lots by CBD commuters. Two additional elements were planned but not carried out: corporate marketing of ridesharing by retired executives; and use of telephone coordinators at DOT to introduce potential carpoolers.

Local agencies involved

Georgia DOT; MARTA; City of Atlanta; Fulton County; Atlanta Regional Commission; local business organizations

Achievements/contributions

The demonstration project promoted ridesharing to over 150 firms with over 113,000 employees during 1980 and 1981, with a focus on firms having more than 100 employees.

Data collection

1. Employer and employee workplace surveys
2. Records of employees applying for rideshare information and who reported switching to ridesharing after program implementation

SITE: Boston, MA
PROJECT: Masspool Ridesharing Demonstration
DATES: April 1980 - (June 1982)
GRANTEE: Massachusetts Department of Public Works
NRDP GRANT: $225,000
EVALUATION: Summary memo by Charles River Associates, June 1982

==========

Goals

Overall project goals not specified in summary memo.

Elements

Numerous specific elements were defined in the original proposal; the following four elements were underway as of June 1982:

1. Inner-city minority labor access
2. Multi-employer-based vanpool program
3. Community-based vanpool program
4. Vanpool incentive strategies

Local agencies involved

Massachusetts Department of Public Works (DPW), Executive Office of Transportation and Construction (EOTC), Metropolitan Area Planning Council (MAPC), Central Transportation Planning Staff (CTPS), Masspool, Inc., Caravan

Achievements/contributions

Work was beginning on four project elements as of June 1982, under the administration of Caravan.

Data collection

None occurred.

SITE: Chicago, IL
PROJECT: Chicago Ridesharing Demonstration Project
DATES: November 1981 - (June 1982)
GRANTEE: Chicago Regional Transportation Authority (RTA)
NRDP GRANT: $215,000
EVALUATION: Summary memo by Crain & Associates, Inc., July 1982

==========

Goals

Goals of the project included: to decrease solo driving to work by increasing use of transit, carpooling, and vanpooling; to help major employers develop employee transportation plans; and to train employer ridesharing program representatives.

Elements

Major elements planned were:

1. Ridesharing promotion to top executives and ridesharing presentations to employees
2. Technical ridesharing assistance to employers
3. Ridesharing incentives development

Local agencies involved

RTA, Chicago Area Transportation Study (CATS), Illinois Institute of Natural Resources (IINR), DuPage Regional Planning Commission (DRPC), Illinois Department of Transportation (IDOT), Northeastern Illinois Planning Commission, Ridesharing Services Association (RSA)

Achievements/contributions

The program generated an estimated value of the in-kind "local match" made by Chicago area employers in finding carpool and vanpool partners for their employees. The value was put at $132,600 per annum for vanpool matching and $112,500 per annum for carpool matching.

Data collection

None occurred.

SITE: Cincinnati, OH
PROJECT: Project Rideshare
DATES: August 1980 - June 1982
GRANTEE: Ohio-Kentucky-Indiana (OKI) Regional Council of Governments
NRDP GRANT: $116,000
EVALUATION: Case study with workplace survey data, report by Crain & Associates, Inc., May 1984

==========

Goals

The project promoted carpooling, vanpooling, and transit usage throughout a three-state area. Goals were defined as targets within the project elements below; for example, the objective of employer-based ridesharing was to reach one third or more of the largest (over 500-employee) firms in the area.

Elements

The five major demonstration elements were as follows:

1. Employer-based ridesharing, with promotion of carpools and employer vanpools and matching;
2. Community-based rideshare marketing and matching;
3. Regional ridesharing promotion to commuters using freeway signs;
4. Development of discount parking lots in the CBD as ridesharing incentives.

Development of additional vanpool services was planned but not implemented as of the end of the demonstration period.

Local agencies involved

OKI; Ohio DOT and other demonstration task force agencies

Achievements/contributions

The project contacted about 350 firms representing one percent of the firms in the region. Over one third of these were firms which employed 500 or more workers. A management staff was recruited and hired specifically for the demonstration project. The structure of the project suggests that use of a multi-agency task force to define the project before its initiation may be one way to reduce inter-agency friction during a demonstration. The demonstration also gave strong evidence that home-based ridesharing is not a feasible technique for market development of this mode.

Data collection

1. Employer and employee workplace survey
2. Records of program contacts, match lists furnished, carpools formed, program costs
3. University of Cincinnati survey of rideshare applicants

SITE: Denver, CO
PROJECT: Denver Metropolitan Ridesharing Program
DATES: August 1980 - (June 1982)
GRANTEE: Colorado Department of Highways (CDH)
NRDP GRANT: $210,000
EVALUATION: Summary memo by Crain & Associates, September 1983

Goals

Goals of the project included: reduction in vehicle miles traveled to conserve energy and reduce air pollution; encouragement of high-occupancy vehicles; development of a range of ridesharing alternatives to complement existing transportation services; encouragement of a shift to higher-occupancy vehicles; and improvement of traffic flow. (These goals were quantified in a series of objectives.)

Elements

Major elements of the program were:

1. Improved carpool locator service using existing computer matching facilities;
2. Employer-sponsored vanpool promotion using workshops about vanpool "success stories";
3. Third-party vanpool programs aimed at the public and small employers;
4. Owner-operated vanpools;
5. Rideshare marketing.

Local agencies involved

CDH; Denver Regional Council of Governments; Denver Chamber of Commerce; Van Pool Services, Inc. (VPSI); Colorado Department of Health; Regional Transit District (RTD)

Achievements/contributions

Over 13,000 rideshare applications were processed, with nine percent of applicants forming carpools. A survey of vanpools in the region was conducted. Vanpools increased by 162 during the demonstration period, but there is no way to determine whether this growth is attributable to the demonstration program.

Data collection

1. DRCOG reports on rideshare matching activities and surveys of commuters
2. VPSI estimates of the benefits from a third-party vanpool program

SITE: Detroit, MI
PROJECT: Detroit and Southeast Michigan National Ridesharing Demonstration Project
DATES: February 1980 - (June 1982)
GRANTEE: Michigan Department of Transportation (MDOT)
NRDP GRANT: $60,000
EVALUATION: Summary memo by Crain & Associates, Inc., July 1982

==========

Goals

Project goals were: to maximize the efficiency of Highway M-24; to coordinate and consolidate existing MDOT rideshare programs; to determine the potential rideshare market and the most efficient mix of carpools and vanpools to serve it; to achieve the environmental and social benefits of ridesharing.

Elements

The demonstration planned to emphasize home-end marketing; major intended elements included:

1. Carpool matching and follow-up
2. Owner-operated vanpools;
3. Commuter buspools;
4. Park-and-ride lots;
5. Rideshare marketing and ongoing assistance.

Local agencies involved

MDOT (with a private consultant)

Achievements/contributions

Preliminary marketing and data base development were the principal tasks accomplished by June 1982. Employers were estimated to be contributing no money or in-kind ridesharing services support in the M-24 corridor.

Data collection

1. M-24 commuters were surveyed to determine the demand for ridesharing.

SITE: Houston, TX
PROJECT: Houston Ridesharing Demonstration Program
DATES: March 1980 - December 1981
GRANTEE: Metropolitan Transit Authority of Harris County (METRO) Carshare Program
NRDP GRANT: $236,000
EVALUATION: Cambridge Systematics, Inc., May 1983

==========

Goals

Goals were defined as targets within the individual elements below.

Elements

Major elements of the demonstration included the following:

1. Rideshare activity centers for carpool matching and employer contact programs;
2. Region-wide third-party vanpool program;
3. Enhanced computer matching system capability;
4. Additional "staging sites" for carpools and vanpools;
5. Rideshare and vanpool promotions.

Planned shuttle bus services were not implemented.

Local agencies involved

Carshare; METRO; Van Pool Services, Inc. (VPSI); developers and other groups associated with the activity centers

Achievements/contributions

More than 7,500 ridesharing requests were processed in 1981. A third party vanpool program showed modest growth, which varied with characteristics of different site environments. The speed of processing match requests improved with a new interactive computer matching capability.

Data collection

1. Employer and employee workplace survey
2. Records of rideshare applications and matching as well as vanpool program growth were kept for three activity centers.

SITE: Jackson, MS
PROJECT: Jackson Ridesharing Demonstration
DATES: November 1979 - (June 1982)
GRANTEE: Central Mississippi Planning and Development District (CMPDD), through the Mississippi State Highway Department
NRDP GRANT: $33,000
EVALUATION: Summary memo by COMSIS, July 1982

==========

Goals

The project was set up to demonstrate the feasibility of joint use of vans for commuter vanpools and senior citizen center transportation.

Elements

Intended elements of the "dual use" program for vans were:

1. Lease of locally acquired vans to employee vanpools in the Jackson CBD;
3. Use of the vans during the day by social service agencies for the elderly.

Local agencies involved

CMPDD; City of Jackson; Mississippi State Highway Department; Mississippi Department of Natural Resources Energy Office

Achievements/contributions

Vans were in use for senior citizens but not for vanpooling as of June 1982.

Data collection

None indicated.

SITE: Lincoln, NE
PROJECT: Lincoln City Home-End Ridesharing Demonstration Project
DATES: May 1980 - June 1982
GRANTEE: City of Lincoln Department of Transportation
NRDP GRANT: $37,070
EVALUATION: Crain & Associates, Inc., May 1984

==========

Goals

Goals were to promote non-single-occupancy auto use for all trip purposes, with a ridesharing program based in the neighborhoods and designed as a complement to existing home-work trip rideshare marketing.

Elements

Main elements of the project included:

1. Resident canvassing by neighborhood ridesharing agents;
2. Rideshare matching efforts focussed on school trips;
3. Shuttle bus service for Christmas holiday shopping.

The project also encouraged use of "alternative modes" of transportation, such as walking, biking, and transit.

Local agencies involved

Transportation Development Division of the Lincoln DOT; ad-hoc technical advisory committees formed from city agencies; neighborhood associations and developers

Achievements/contributions

The demonstration illustrated the cost and difficulties associated with a home-based ridesharing program. The use of personalized ridesharing promotion was not found to affect use of alternative travel modes by groups receiving marketing. Evidence suggests differences in use of alternative modes is based on differing travel needs and socio-economic characteristics.

Data collection

1. Neighborhood canvassing survey of travel behavior, needs and concerns
2. Telephone survey of socio-economic characteristics and travel behavior
3. Records of applications for rideshaing and of matches

SITE: Louisville, KY
PROJECT: Louisville National Ridesharing Demonstration Program
DATES: (Final contract for NRDP not signed as of June 1982)
GRANTEE: Kentuckiana Regional Planning and Development Agency (KIPDA), through Kentucky Department of Transportation (KYDOT)
NRDP GRANT: $126,667
EVALUATION: Summary memo by Crain & Associates, July 1982

==========

Goals

The primary goal was to alleviate congestion and delays during the reconstruction of a bridge deck on Highway I-65 through Louisville.

Elements

Major proposed elements were:

1. Priority strategies for high occupancy vehicles;
2. Vanpool revolving fund for purchase of vehicles, with priority for commuters in the I-65 corridor;
3. Rideshare marketing program for employers, employees, residents and neighborhood groups;
4. Incentives for high occupancy vehicles, disincentives for single-occupancy autos.

Local agencies involved

KIPDA, KYDOT, Action Now, Louisville Chamber of Commerce, Jefferson County, other agencies on the project steering committee

Achievements/contributions

The project estimated the value of rideshare matching services from 200 area employers to be about $300,000 per annum.

Data collection

None indicated.

SITE: North Carolina
PROJECT: North Carolina Ridesharing Demonstration
DATES: May 1980 - June 1982
GRANTEE: North Carolina Department of Transportation (DOT), Division of Pubic Transportation
NRDP GRANT: $258,000
EVALUATION: Case study report by COMSIS, May 1984

==========

Goals

Principal goals were to coordinate ridesharing efforts between the region and the state; to establish ridesharing as integral to the transportation planning process; to expand existing rideshare programs to match regional commuting patterns; to increase intra-county peak-hour vehicle occupancy from 1.3 to 1.5; and to attack site-specific problems on a case-by-case basis.

Elements

Major elements included:

1. Rideshare marketing and educational efforts through radio, newspaper, and billboard advertising;
2. Employer contact in three project areas;
3. Park-and-ride lots with signage to promote ridesharing;
4. Rideshare matching activities;

Local agencies involved

North Carolina DOT, City of Raleigh, Charlotte-Mecklenburg County, City of Durham, City of Winston-Salem, City of Greensboro, City of High Point, Town of Chapel Hill

Achievements/contributions

The project demonstrated the relative effectiveness of different rideshare organizational structures across similar geographic regions. It also showed the usefulness of highway signs and billboards as well as signed park-and-ride lots in raising public awareness of ridesharing. The project suggests that sharing local ridesharing "generalist" with state-level specialist skills is both feasible and effective. A ridesharing film was developed and circulated.

Data collection

1. Telephone survey before and after project media campaign
2. Records of ridesharing coordinator activity: requests processed, riders matched
3. Postcard survey of park and ride lot users

SITE: Philadelphia, PA
PROJECT: Philadelphia National Rideshare Demonstration Project
DATES: June 1981 - (June 1982)
GRANTEE: Delaware Valley Regional Planning Commission (DVRPC), through Pennsylvania Department of Transportation (PennDOT)
NRDP GRANT: $150,000
EVALUATION: Summary memo by COMSIS, November 1982

==========

Goals

The primary intended goal of the project was to increase ridesharing in the Philadelphia region through the use of innovative approaches.

Elements

Elements to be tried included:

1. Marketing transit passes to CBD employers;
2. Preferential parking for high occupancy vehicles;
3. Trial loan of vans to vanpool groups;
4. Rideshare marketing targeted to small employers and municipal employers.

Local agencies involved

DVRPC, PennDOT, Southeastern Pennsylvania Transportation Authority

Achievements/contributions

Some progress was made on three of the four items: the transit authority agreed to market the sale of transit passes, the cost to be paid by demonstration funds; one van was leased for trial vanpooling operations; grassroots marketing was underway.

Data collection

None indicated.

SITE: Portland, OR
PROJECT: Portland, Oregon Ridesharing Demonstration
DATES: November 1979 - October 1981
GRANTEE: Tri-County Metropolitan District of Oregon (Tri-Met)
NRDP GRANT: $267,333
EVALUATION: Case study with workplace survey data, report by DeLeuw, Cather & Company, January 1984

==========

Goals

Principal goals were to increase the number of new ridesharers; to develop personalized employer transportation programs for increasing the number of ridesharing employees; to increase the number of owner-operated vanpools in the region; to identify and address barriers to ridesharing.

Elements

Major elements included:

1. Expanded employer-based ridesharing promotion through use of outreach or consulting services, transportation coordinators, customized ridesharing programs, and carpool matching;
2. Owner-operated vanpool promotion through direct mail;
3. Analysis of institutional barriers and incentives.

Local agencies involved

Portland Rideshare Project (Tri-Met)

Achievements/contributions

The employer outreach program contacted firms with about one third of the area's employees. The project developed useful profile data on employers and employees and their reasons for or against rideshare participation and also mode split information and information regarding vanpool operation. Formal training sessions were held for transportation coordinators.

Data collection

1. Employer and employee workplace survey
2. Project records of firms contacted, company profile forms returned, employee surveys, and employer transportation programs

SITE: San Antonio, TX
PROJECT: San Antonio National Ridesharing Demonstration Project
DATES: September 1980 - (June 1982)
GRANTEE: Transportation Energy Conservation Program (part of the San Antonio Department of Planning)
NRDP GRANT: $33,750
EVALUATION: Summary memo by Cambridge Systematics, Inc., October 1982

==========

Goals

The project was intended to demonstrate the effectiveness of community-based ridesharing.

Elements

Initially planned project elements included:

1. Individual ridesharing programs for each city council district;
2. Expanded ridesharing organization, including a comprehensive task force for review of rideshare efforts and task forces in each district;

Later added were:

3. Increased employer involvement in ridesharing programs;
4. Development of ridesharing brochures, workshops, computer matching;
5. Organization of community ridesharing advisory board with representatives from large firms.

Local agencies involved

TECP, Metropolitan Transit Authority, City Manager's Office, Texas State Department of Highways and Public Transportation

Achievements/contributions

The demonstration conducted a comprehensive survey of ridesharing program activities in San Antonio and generated a profile of its findings. A series of workshops and meetings with employers was held. The demonstration suggests that the visible use of political resources for ridesharing suppport has drawbacks as well as advantages.

Data collection

1. Survey of ridesharing programs

SITE: Seattle, WA
PROJECT: Seattle Ridesharing Demonstration
DATES: August 1979 - January 1982
GRANTEE: Seattle-King County Commuter Pool (part of the City of Seattle Traffic Engineering Division)
NRDP GRANT: $369,500
EVALUATION: Case study with workplace survey data, report by DeLeuw, Cather & Company, January 1984

==========

Goals

Broad goals included reduction of pollution and congestion. Specific goals were to increase shared use of vanpools; to review ridesharing incentives in environmental impact statement requirements; to propose zoning modifications to encourage ridesharing; to develop employer workshops; to replace or maintain park and pool lots; to increase lot utilization; and to develop joint promotion of flextime with the metropolitan transit authority.

Elements

Principal elements included:

1. Shared-use specialized vanpools;
2. Ridesharing incentives development;
3. Bellevue Activity Center promotion;
4. Expanded Park-and-Pool Program;
5. Private sector workshops

Local agencies involved

Commuter Pool, DOT, Metro, King County, City of Seattle, other cities

Achievements/contributions

The demonstration identified and prioritized 55 incentives to ridesharing. Private sector workshops were held, and some firms induced to adopt flextime programs. The Bellevue zoning code was amended to encourage developer promotion of ridesharing. The network of park and pool lots was expanded, and utilization of the lots was increased through the use of "performance surveillance" techniques. A vanpool tax exemption act was drafted by the project and later passed by the legislature.

Data collection

1. Employer and employee workplace survey
2. Project records of contacts with firms
3. Windshield survey of park and ride lot users

SITE: Southern California
PROJECT: The In-House Ridesharing Coordinator
DATES: January 1980 - December 1982
GRANTEE: Commuter Transportation Services, Inc. (CTS, Inc.) and the Southern California Association of Governments (SCAG)
NRDP GRANT: $330,844
EVALUATION: Report by CSI, March 1983

==========

Goals

The principal goal was to demonstrate the effectiveness of personalized matching by trained in-house transportation coordinators in increasing the number of employees ridesharing to work.

Elements

Major elements were as follows:

1. Transportation coordinator training;
2. Personalized rideshare matching;
3. Transit liaison;
4. Rideshare information;
5. Use of company resources for ridesharing;
6. Taxipool encouragement;
7. Vanpool, private bus encouragement.

Local agencies involved

CTS, Inc. (and 30 associated firms), SCAG, California DOT, L.A. Chamber of Commerce, L.A. County Transportation Committee, San Bernardino Association of Governments,
Southern California Rapid Transit District

Achievements/contributions

The demonstration designed and developed training program materials for the use of 95 ridesharing coordinators. The project suggests that management recognition and support is important to the success of a ridesharing program.

Data collection

1. Pre- and post-demonstration employee surveys
2. Ridesharing coordinator logs recording project activities and cost
3. Employer contact reports

SITE: Tidewater, VA
PROJECT: Maxi-Taxi (later, Maxi-Ride)
DATES: November 1980 - December 1981
GRANTEE: Tidewater Regional Transit Authority (TRT)
NRDP GRANT: $65,000
EVALUATION: Case study report by COMSIS, July 1984

Goals

The main goal was to demonstrate the feasibility and cost-effectiveness of shared-ride taxi as a supplement or replacement to conventional public transit in a regional transportation network.

Elements

Initial project elements, modified over time, were as follows:

1. New (alternative) transportation services in low-density markets;
2. Feeder services to fixed-route buses;
3. Selective time-of-day replacement for fixed-route buses;
4. Downtown shuttle service linking a pedestrian mall with the financial district;
5. Medium-density corridor jitney service.

Local agencies involved

TRT, Amalgamated Transit Workers Union

Achievements/contributions

The demonstration showed that small-vehicle, fixed-route (jitney-type) service could be an effective replacement for conventional transportation services, under certain conditions. Considerable information on cost, performance, demand, contracting procedures and management of operations was gathered by the demonstration. The project showed the value of marketing activities to gain support for planned replacement service. It also provides information on the tradeoffs between use of public and private paratransit services.

Data collection

1. Monthly service, ridership, cost and revenue data for each demonstration route
2. On-board rider surveys on riders, trip information, origins and destinations, and transfers

APPENDIX B

SAMPLE EMPLOYER AND EMPLOYEE QUESTIONNAIRES

EMPLOYER PROFILE

[MAILING LABEL]

Please correct the label if necessary.

serial no. 1-4

1 card no. 5

Name, Title, and Department of Person Filling Out This Form

Name _____ Title _____

Department _____ Telephone _____ Ext. _____

SECTION A - INFORMATION ABOUT YOUR ORGANIZATION

1. Which of the following best describes your organization? (Check one)

6-01 ☐ Manufacturing
-02 ☐ Retail trade
-03 ☐ Wholesale or supplier
-04 ☐ Financial services — e.g., bank, insurance, real estate
-05 ☐ Legal services
-06 ☐ Business services — e.g., advertising, consulting, data processing
-07 ☐ Other commercial services — e.g., hotel, laundry, repair
-08 ☐ Health and social services
-09 ☐ Transportation, communications, or utility
-10 ☐ Educational institution
-11 ☐ Government
-12 ☐ Military
-13 ☐ Other (specify) _____

8 ☐

2. How long has your organization been in existence? ___ (9) years or ___ (11) months

3. How long has your organization been at this location? ___ (13) years or ___ (15) months

4. Is this location your organization's headquarters? 17-1 ☐ Yes 17-2 ☐ No

5. What is the approximate gross floor area at this location? ___ (18-24) sq. ft.

6. What is the total land area at this location? _____ sq. ft. or ____ acres

25-31

7. How many employees does your organization have at this location? ___ (32-36)

8. Approximately how many of these employees are new to your organization since one year ago?

___ (37-41)

9. Does your organization have any other work locations (divisions, plants, offices, etc.) in the Atlanta metropolitan area in addition to this location?

42-1 ☐ Yes
→ How many other work locations? ___ (43)
→ How many employees does your organization have at these other work locations? ___ (45-49)

-2 ☐ No

10. Please indicate the number of employees at this location who are in each of the following categories.

	Number of Employees		Number of Employees
Salesperson	6–10	Service worker	26–30
Clerical/office worker	11–15	Professional/technical	31–35
Shop/production worker	16–20	Manager/administrator	36–40
Craftsman or foreman	21–25	Transportation/driver	41–45

Other (specify) _____

serial 1-4 | 2 | card no. 5

11. What percentage of employees at this location are...

Temporary or seasonal? 46–48 %

Part-time? 49–51 %

Female? 52–54 %

12. Are employees at this location permitted to vary their work start times?

55-1 ☐ Yes -- Please specify any restrictions on eligibility _____

_____

55-2 ☐ No

56

13. Are there multiple work shifts and/or staggered start times at this location?

58-1 ☐ No

-2 ☐ Yes, there are multiple shifts
→ How many shifts are there? 59–59
→ How many employees are assigned to the largest shift? 60–64

-3 ☐ Yes, there are staggered start times

SECTION B - INFORMATION ABOUT PARKING

14. How many parking spaces does your organization furnish for employees working at this location?

65-1 ☐ None -- we furnish no employee parking (SKIP TO QUESTION 19)

-2 ☐ We furnish _____ spaces (66–70)

serial 1-4 | 3 | card no. 5

15. Of these parking spaces, how many are leased by your organization?

6–9 spaces leased at an average cost of $10–13 per space per month

16. How much do you charge employees for parking? $14–17 per space per month

17. Are all employees eligible for these spaces?

18-1 ☐ Yes

-2 ☐ No -- Please specify restrictions and number of employees eligible

_____

19–21 | 21 | 22–25

18. What is the annual cost of maintaining your parking facilities? $26–32

19. Is there free parking within 1/4 mile of your location? 33-1 ☐ Yes 33-2 ☐ No

20. Is there paid parking within 1/4 mile of your location?

34-1 ☐ Yes

What type(s)? (Check all that apply)

35-1 ☐ On-street, metered
36-1 ☐ Off-street, indoor
37-1 ☐ Off-street, outdoor

What is the average rate for off-street parking?

$38–41 per space per day or

$42–45 per space per month

34-2 ☐ No

SECTION C - CURRENT ACTIVITIES RELATED TO EMPLOYEE COMMUTING

21. At the present time, does your organization do any of the following? (Please answer yes or no for each item)

	Yes	No	
46-1	☐	-2 ☐	Provide employees with information on commuting options (e.g., MARTA routes and schedules)
47-1	☐	-2 ☐	Allow employees to use company cars for commuting
48-1	☐	-2 ☐	Provide or contract for bus service to transport employees to and from work
49-1	☐	-2 ☐	Sell or provide MARTA passes to employees
50-1	☐	-2 ☐	Assist employees in forming or joining carpools/vanpools
51-1	☐	-2 ☐	Provide special incentives to employees who carpool
52-1	☐	-2 ☐	Provide vans which are used by employee vanpool groups
53-1	☐	-2 ☐	Other (specify) _____

54

If you checked yes to any of the above, please complete the rest of this section. You need only answer those questions pertaining to particular activities in which your organization is currently involved.

If you checked no to all of the above, please skip to Page 5, Section D.

---

22. For what reason(s) did your organization begin its involvement with employee transportation to and from work? (Check all that apply)

- 56-1 ☐ To reduce parking requirements and costs
- 57-1 ☐ In response to fuel shortage
- 58-1 ☐ To improve competitive standing in the labor market
- 59-1 ☐ To make possible a move to this location
- 60-1 ☐ To allow expansion of facilities at this location
- 61-1 ☐ To provide an additional employee fringe benefit
- 62-1 ☐ In response to employee requests
- 63-1 ☐ To comply with local zoning or other government requirements
- 64-1 ☐ Other (specify) _____

65

23. If you allow employees to use company cars for commuting...

a. How many cars are used for this purpose? ___ (67)

b. Do you charge employees for these cars?

70-1 ☐ Yes How much? ___ (71) cents per mile or $___ (73) per month

70-2 ☐ No

serial 1-4

4 card no. 5

24. If you provide or contract for bus service to transport employees to and from work...

a. Approximately when did your organization begin providing this bus service? _____ month/year

6

b. Do you contract for this service? 10-1 ☐ Yes 10-2 ☐ No

c. How many buses are operated each day? ___ (11)

d. What is the total monthly cost of providing this service? $___ (13-17)

e. How many employees use this service? ___ (18)

f. What is the total monthly amount collected in fares from employees who use this service? $___ (22-26)

25. If your organization sells or provides MARTA passes to employees...

a. How many passes are sold or provided in an average month? ____ (27)

b. Does your organization subsidize employees' purchase of MARTA passes?

31-1 ☐ Yes
→ How much is the subsidy? $____ (32) or ____ (35) % of purchase price
-2 ☐ No

26. If your organization assists employees in forming or joining carpools/vanpools...

a. Which of the following activities has your organization undertaken? (Check all that apply)

38-1 ☐ Distribution of brochures on carpooling/vanpooling
39-1 ☐ Display of carpool/vanpool posters
40-1 ☐ Official encouragement of carpooling/vanpooling by management
41-1 ☐ In-house matching service — Please describe briefly _____

_____

42-1 ☐ Matching service performed by the Georgia Ridesharing Program
43-1 ☐ Employee get-togethers to facilitate carpool/vanpool formation
44-1 ☐ Other (specify) _____

b. Approximately when did your organization begin providing this type of assistance?
_____ month/year

c. How many employees are assisted in an average month? ____ (53)

d. Is there a particular office or individual(s) with responsibility for this function?

57-1 ☐ Yes
→ How many people are involved in these activities? ____ (58)
→ Approximately how many person-hours per month are devoted to these activities? ____ (60)
57-2 ☐ No

e. Approximately how much does your organization spend per month on these activities (including labor, supplies, overhead, and other expenses)?
$ ____ (64–68)

27. If your organization provides special incentives to employees who carpool or vanpool...

a. Which of the following incentives are offered? (Check all that apply)

69-1 ☐ Preferential or reserved parking
70-1 ☐ Free parking
→ How many pool groups get free parking? ____ (74)
71-1 ☐ Reduced parking charge
→ How much is the reduced charge? $ ____ (78) per space per month
→ How many pool groups pay a reduced parking charge? ____ (6)
72-1 ☐ Monetary incentive
→ How much is the incentive, per month?
$ ____ (10) per pool group or $ ____ (15) per individual
→ How many pool groups or employees receive monetary incentives?
____ (16) pool groups or ____ (20) employees
73-1 ☐ Other (specify) _____

b. Approximately when did your organization begin providing these incentives?
_____ month/year

c. Are there any eligibility requirements to qualify for these privileges?

29-1 ☐ Yes — Please describe _____
-2 ☐ No

serial (1-4)
5 card no. (5)

(45) (47) (49) (24) (25) (30)

28. If you provide vans for employee vanpool groups...

a. Approximately when did your organization begin providing vans?
_____ month/year

b. How many vans do you provide at present? [35]

c. Of these, how many are leased?
[38] are leased at an average cost of $[41] per van per month

d. What is the total monthly amount collected from employees who use the vans you provide (excluding charges for personal use of the van)? $[44]

e. Is van maintenance performed in-house? [49-1] ☐ Yes [49-2] ☐ No

---

SECTION D - VIEWS ABOUT EMPLOYER-SPONSORED RIDESHARING PROGRAMS

Please answer all the questions in this section, whether or not you are currently involved in ridesharing activities.

29. What do you think are the three most important benefits or advantages of employer-sponsored efforts to promote carpooling and vanpooling among employees? Please place a "1" beside the most important benefit, "2" beside the second most important benefit, and "3" beside the third most important benefit.

[50] ___ Relief of traffic congestion
[51] ___ Energy conservation
[52] ___ Improved image within the community
[53] ___ Reduced parking requirements
[54] ___ More parking for customers and visitors
[55] ___ Able to expand facilities without moving or acquiring more land
[56] ___ Effective fringe benefit to recruit/retain employees
[57] ___ Able to hire people without autos and people who live farther away
[58] ___ Improved competitive standing in the labor market
[59] ___ Improved employee punctuality
[60] ___ Reduced employee absenteeism
[61] ___ Reduced overtime requirements
[62] ___ Improved employee morale
[63] ___ Other (specify) _____
_____

30. What do you think are the three most important barriers to or disadvantages of employer-sponsored efforts to promote ridesharing?
(1 = most important, 2 = second most important, 3 = third most important)

[66] ___ Inappropriate employer role
[67] ___ Difficult to initiate
[68] ___ Few employees benefit
[69] ___ Potential liability risks
[70] ___ Insurance costly or unavailable
[71] ___ Regulatory restrictions
[72] ___ Potential complications involving labor negotiations
[73] ___ High start-up costs
[74] ___ High operating costs
[75] ___ Large staff time requirements
[76] ___ Employees who carpool work fewer hours
[77] ___ Employees who carpool are unwilling to stay after hours
[78] ___ Employees who carpool are less punctual
[79] ___ Other (specify) _____
_____

serial 1-4
6 card no. 5

31. Please read the following list of employee fringe benefits and indicate for each item (a) whether you believe it is effective in attracting or retaining employees and (b) whether the benefit realized by employees is at least as large as the cost of the activity to the employer.

	Effective in attracting or retaining employees?		Benefit to employees at least as large as cost to employer?	
	Yes	No	Yes	No
Group health insurance	6-1 ☐	-2 ☐	20-1 ☐	-2 ☐
Free parking	7-1 ☐	-2 ☐	21-1 ☐	-2 ☐
Maternity leave	8-1 ☐	-2 ☐	22-1 ☐	-2 ☐
Life insurance	9-1 ☐	-2 ☐	23-1 ☐	-2 ☐
Company car	10-1 ☐	-2 ☐	24-1 ☐	-2 ☐
Paid vacation	11-1 ☐	-2 ☐	25-1 ☐	-2 ☐
Group dental insurance	12-1 ☐	-2 ☐	26-1 ☐	-2 ☐
Flexitime	13-1 ☐	-2 ☐	27-1 ☐	-2 ☐
Pension plan	14-1 ☐	-2 ☐	28-1 ☐	-2 ☐
Assistance in forming or expanding carpools	15-1 ☐	-2 ☐	29-1 ☐	-2 ☐
Employer-provided vans	16-1 ☐	-2 ☐	30-1 ☐	-2 ☐
Tuition assistance	17-1 ☐	-2 ☐	31-1 ☐	-2 ☐
On-site day care	18-1 ☐	-2 ☐	32-1 ☐	-2 ☐
Paid sick leave	19-1 ☐	-2 ☐	33-1 ☐	-2 ☐

32. Are you familiar with the activities of the Georgia Ridesharing Program?

34-1 ☐ Yes
-2 ☐ No

33. Has your organization ever contacted or been contacted by the Georgia Ridesharing Program?

35-1 ☐ Yes — we contacted the Georgia Ridesharing Program
-2 ☐ Yes — we were contacted by the Georgia Ridesharing Program
-3 ☐ No (SKIP QUESTIONS 34 AND 35)

34. Which of the following did you receive from the Georgia Ridesharing Program? (Check all that apply)

36-1 ☐ Information on carpooling/vanpooling
37-1 ☐ Briefing on carpooling/vanpooling
38-1 ☐ Assistance in performing in-house matching
39-1 ☐ Employee match lists prepared by the Georgia Ridesharing Program
40-1 ☐ Assistance in obtaining vans
41-1 ☐ Assistance in forming and operating vanpools
42-1 ☐ Other (specify) _____

☐ 43

35. Were you generally satisfied with the service your organization received from Georgia Ridesharing Program?

45-1 ☐ Yes
-2 ☐ No - In what ways could the service be improved? _____

_____

☐ 46

THANK YOU VERY MUCH FOR YOUR COOPERATION. PLEASE USE THE SPACE BELOW FOR ANY COMMENTS

☐ 48

EMPLOYEE SURVEY

This travel survey will be used by local transportation agencies to improve travel conditions in the Atlanta area. Please answer the following questions as accurately as possible. Your responses will be strictly confidential.

serial 1-5

card no. 1 — 6

1. How do you most often commute to and from work? (Check all that apply if you usually use a combination of means to make a one-way trip)

7-1 ☐ Drive alone
8-1 ☐ Drive or ride with one or more other people
9-1 ☐ MARTA express bus
10-1 ☐ MARTA local bus
11-1 ☐ MARTA rail
12-1 ☐ Private or employer-sponsored bus
13-1 ☐ Taxi
14-1 ☐ Motorcycle or bicycle
15-1 ☐ Walk
16-1 ☐ Other (specify) _____

17

2. Please number in order of importance the three most important factors which influence how you most often commute to and from work. (1=most important, 2=second most important, 3=third most important)

18 ___ Low cost
19 ___ Fast travel time
20 ___ Convenience
21 ___ Schedule requirements
22 ___ Household vehicle unavailable
23 ___ Transit unavailable
24 ___ Parking unavailable or too expensive at workplace
25 ___ Need car during working hours
26 ___ Need to make stops on the way to or from work
27 ___ Employer provides subsidy for commuting (e.g., free parking or discounted transit pass)
28 ___ Exercise, health, like to walk
29 ___ Environmental concern, energy conservation
30 ___ Other (specify) _____

31

3. Thinking back over the last five days you worked (excluding today), please indicate how many times you used each of the following means to travel to and from work.

	To Work	From Work
Drove alone	33 ___ days	34 ___ days
Drove or rode with one or more other people	35 ___ days	36 ___ days
MARTA express bus	37 ___ days	38 ___ days
MARTA local bus	39 ___ days	40 ___ days
MARTA rail	41 ___ days	42 ___ days
Private or employer-sponsored buspool	43 ___ days	44 ___ days
Taxi	45 ___ days	46 ___ days
Motorcycle or bicycle	47 ___ days	48 ___ days
Walked	49 ___ days	50 ___ days
Used combination of above (specify) _____	51 ___ days	52 ___ days
Other (specify) _____	53 ___ days	54 ___ days

55

57

4. What is your home zip code? 59 _____

64

5. How many miles is it from your home to your place of work? _____

6A. How long does it take to travel from your home to your place of work during commuting hours if you drive by the most direct route without any stops?

_____ minutes

67

6B. How long does it take to travel from your home to your place of work during commuting hours if you use MARTA? (including the time you spend walking or driving to and from MARTA)

73-1 ☐ _____ minutes
-2 ☐ Don't know
-3 ☐ MARTA is not available between my home and my place of work

70

7. Do you work full-time or part-time?

☐ Full-time ____ days per week ☐ Part-time ____ days per week

8. Which of the following best describes your work schedule? (Check one)

- ☐ I have fixed work hours which are set by my employer
- ☐ I can choose my own work schedule, but I must start work at the same time each day
- ☐ I can vary my start time each day by up to ____ minutes or ____ hours
- ☐ I have a very irregular work schedule
- ☐ I work a rotating shift
- ☐ Other (specify) _____

9. At what time do you most often... (ANSWER BOTH PARTS BELOW)

Begin work? ☐ am ☐ pm (Check one)

Leave work? ☐ am ☐ pm (Check one)

10. Do you have a valid driver's license? ☐ Yes ☐ No

11. How many vehicles (cars, vans, pick-up trucks, or motorcycles) in operating condition are available for use by members of your household? (including company cars)

☐ ____ vehicles
☐ None (SKIP TO QUESTION 16)

12. Please indicate for each vehicle: its year/make/model, its average fuel economy (miles per gallon), and the month and year you acquired it.

	Year/Make/Model	Average miles per gallon	Month/year acquired
Vehicle #1			
Vehicle #2			
Vehicle #3			
Vehicle #4			

13. Which vehicle do you use most often for your commute trip? (Check one)

- ☐ Vehicle #1
- ☐ Vehicle #2
- ☐ Vehicle #3
- ☐ Vehicle #4
- ☐ None -- I never drive to work

14. Within the past two years, has anyone in your household purchased a vehicle?

☐ Yes
☐ No (SKIP TO QUESTION 16)

15. Was this a replacement for another household vehicle?

☐ Yes What was the year/make/model and average miles per gallon of the vehicle which was replaced?

_____ _____ mpg

☐ No

16. In this survey, "carpool" means two or more people (including family members) who commute together on a regular basis in a car, van, or pick-up truck. This includes vanpools. Are you currently a member of a carpool?

☐ Yes
☐ No (SKIP TO PAGE 5)

PLEASE ANSWER THE QUESTIONS ON THIS PAGE ONLY IF YOU ARE CURRENTLY A MEMBER OF A CARPOOL — THAT IS, IF YOU ANSWERED "YES" TO QUESTION 16. OTHERWISE, PLEASE SKIP TO PAGE 5.

17. How many people including yourself usually participate in your carpool even if they do not ride every day? 17[ ] people

18. How many of the other people in your carpool... (ANSWER ALL FOUR PARTS BELOW)

Live in the same household as you?	19[ ]	person(s)
Work for the same employer as you?	21[ ]	person(s)
Work in the same location as you but for a different employer?	23[ ]	person(s)
Are male?	25[ ]	person(s)

19. How long have you been commuting with at least one other member of your carpool? _____ months or _____ years

27

20. Were any members of your carpool commuting together before you joined?

30-1 ☐ No
-2 ☐ Yes ——► For how long before you joined? _____ months or _____ years

31

21. Please number in order of importance your three most important reasons for joining or forming a carpool. (1=most important, 2=second most important, 3=third most important)

34- [ ] I like to commute with family members
35- [ ] I prefer not having to drive all the time
36- [ ] Carpooling saves wear and tear on my auto
37- [ ] Carpooling is cheaper than driving alone or taking MARTA
38- [ ] I like company on the trip to work
39- [ ] My employer provides special parking privileges for carpools
40- [ ] Information or assistance from the Georgia Ridesharing Program
41- [ ] More convenient than MARTA
42- [ ] Faster that MARTA
43- [ ] Convenience to other carpool members
44- [ ] Other (specify)_____

46

22. How did you join or form your carpool? (Check as many as apply)

48-1 ☐ Household members decided to commute together
49-1 ☐ Advertisement in local newspaper
50-1 ☐ Company newsletter or bulletin board
51-1 ☐ Company matching program
52-1 ☐ Information or assistance from the Georgia Ridesharing Program
53-1 ☐ Informal contact with someone at work
54-1 ☐ Informal contact with someone in my neighborhood
55-1 ☐ Other (specify)_____

56

23. Does your carpool make use of any of the following? (Answer yes or no for each item)

	Yes	No	
58-1	☐	-2 ☐	Preferential parking spaces for carpools
59-1	☐	-2 ☐	Reduced parking rates for carpools
60-1	☐	-2 ☐	Employer vans
61-1	☐	-2 ☐	Park and ride lots
62-1	☐	-2 ☐	Other (specify) _____

64

24. Which of the following best describes your carpool arrangement? (Check one)

66-1 ☐ One person drives all the time
-2 ☐ Driving is shared by all carpool members
-3 ☐ Driving is shared by some carpool members

THIS PAGE FOR CARPOOL MEMBERS ONLY

25. How often are you the driver of your carpool? (Check one)

67-1 ☐ Always (ANSWER QUESTIONS IN COLUMN A ONLY)
2 ☐ Sometimes, _____ days per week (ANSWER QUESTIONS IN COLUMNS A AND B)
3 ☐ Sometimes, every _____ days (ANSWER QUESTIONS IN COLUMNS A AND B)
4 ☐ Sometimes, every _____ weeks (ANSWER QUESTIONS IN COLUMNS A AND B)
5 ☐ Never (ANSWER QUESTIONS IN COLUMN B ONLY)

68

serial 1-5
4 card no. 6

COLUMN A

THE FOLLOWING QUESTIONS APPLY TO YOUR TRIP TO WORK WHEN YOU DRIVE THE OTHER MEMBERS OF YOUR CARPOOL. PLEASE SKIP TO COLUMN B IF YOU NEVER ARE THE DRIVER.

A1. What vehicle do you most often use when you drive others? (Indicate year/make/model)

_____ 7

A2. How many passengers are usually picked up at your home (including family members)? _____ 8

A3. How many stops do you usually make to pick up passengers?

10-1 ☐ None

10-2 ☐ One
→ How far is it from your home to this pick-up point? _____ miles 11

10-3 ☐ Two or more (ANSWER BOTH QUESTIONS BELOW)
→ How far is it from your home to the first pick-up point? _____ miles 14
→ How far is it from the first to last pick-up point? _____ miles 17

A4. Do you drive directly to your parking place at work or do you stop to drop off passengers?

20-1 ☐ Drive directly to parking place at work
→ How far is it from the place where the last passenger is picked up (which may be your home) to your parking place?
_____ miles 21

20-2 ☐ Stop to drop off passengers (ANSWER ALL FOUR QUESTIONS BELOW)
→ How many stops do you usually make (excluding your parking place)?
_____ stops 24
→ How many passengers are usually dropped off before you park your vehicle?
_____ passengers 26
→ How far is it from the place where the last passenger is picked up (which may be your home) to the first drop-off point?
_____ miles 28
→ How far is it from the first drop-off point to your parking place?
_____ miles 31

NOW ANSWER QUESTIONS IN COLUMN B ABOUT YOUR TRIP TO WORK AS A CARPOOL PASSENGER.
SKIP TO PAGE 5 IF YOU NEVER ARE A PASSENGER.

COLUMN B

THE FOLLOWING QUESTIONS APPLY TO YOUR TRIP TO WORK WHEN YOU ARE A PASSENGER IN YOUR CARPOOL. PLEASE SKIP TO PAGE 5 IF YOU NEVER ARE A PASSENGER.

B1. Where are you usually picked up in the morning?

34-1 ☐ At home
-2 ☐ At some other meeting place (ANSWER BOTH QUESTIONS BELOW)
→ How far is it from your home to the meeting place? _____ miles 35
→ How do you travel to the meeting place?
38-1 ☐ Auto 38-2 ☐ Other means

B2. How many passengers are usually picked up at the same place as you (excluding yourself and the driver)?

39-1 ☐ None
-2 ☐ _____ passengers are picked up at the same place as I am 40

B3. How many passengers are usually picked up after you?

42-1 ☐ None
-2 ☐ _____ passengers are picked up after me at _____ different locations 43

B4. How many passengers are usually dropped off before you?

47-1 ☐ None
-2 ☐ _____ passengers are dropped off before me at _____ different locations 48

B5. Where are you usually dropped off in the morning?

52-1 ☐ At work
-2 ☐ Other (specify) _____ 53

B6. How many passengers are usually dropped off at the same place as you (excluding yourself and the driver)?

_____ passengers 55

B7. How far is it from the place where you are picked up to the place where you are dropped off?

_____ miles 57

B8. Is the vehicle left at home when you are a carpool passenger driven by others in your household while you are at work? (Check one)

60-1 ☐ There is no extra vehicle left at home as a result of my carpooling
-2 ☐ No, the vehicle is not driven by others
-3 ☐ Yes, for fewer miles than I would have driven it
-4 ☐ Yes, for more miles than I would have driven it
-5 ☐ Yes, for about the same number of miles as I would have driven it

THE QUESTIONS ON THIS PAGE SHOULD BE ANSWERED BY EVERYONE

26. Were you living in the Atlanta metropolitan area two years ago?

61-1 ☐ Yes
-2 ☐ No (SKIP TO QUESTION 29)

27. Were you working two years ago? (Check one)

62-1 ☐ Yes, full-time
-2 ☐ Yes, part-time
-3 ☐ No (SKIP TO PAGE 6)

28. At that time, were you... (ANSWER EACH QUESTION BELOW)

	Yes	No
Working for the same employer as now?	63-1 ☐	-2 ☐
Working at the same location as now?	64-1 ☐	-2 ☐
Residing in the same location as now?	65-1 ☐	-2 ☐

29. If you worked or lived in a different location, how many miles was it from your home to your place of work? _____ miles

66 ☐

30. How did you most often travel to and from work two years ago? (Check all that apply if you usually used a combination of means to make a one-way trip)

69-1 ☐ Drove alone
70-1 ☐ Drove or rode with one or more other people
71-1 ☐ MARTA express bus
72-1 ☐ MARTA local bus
73-1 ☐ Private or employer-sponsored buspool
74-1 ☐ Motorcycle or bicycle
75-1 ☐ Walked
76-1 ☐ Other (specify) _____
77-1 ☐ _____
Not applicable -- I was not working two years ago (SKIP TO PAGE 6)

78 ☐

serial 1-5 ☐ card no. 5
6

31. Approximately how many days per week did you... (ANSWER BOTH PARTS BELOW)

Travel to work by the means checked above? 7 ☐☐ days
Travel from work by the means checked above? 8 ☐☐ days

32. If you drove alone or drove with other people, what vehicle did you most often drive?
(Specify year/make/model) _____

9 ☐☐☐☐

IF YOU WERE NOT IN A CARPOOL TWO YEARS AGO, PLEASE SKIP TO PAGE 6.

33. How many people were in your carpool two years ago (including yourself)? ☐☐
15

34. How many of the other members of your carpool... (ANSWER ALL THREE PARTS BELOW)

Lived in the same household as you? 17 ☐☐☐ person(s)
Worked for the same employer as you? 19 ☐☐☐ person(s)
Worked in the same location as you but for a different employer? 21 ☐☐☐ person(s)

35. How often were you the driver of your carpool? (Check one)

23-1 ☐ All the time
-2 ☐ Some of the time, _____ days per week
-3 ☐ Some of the time, every _____ days
-4 ☐ Some of the time, every _____ weeks
-5 ☐ Never

24 ☐

36. What was the average fuel economy of all the vehicles used by your carpool?

☐☐☐ miles per gallon
26

THE QUESTIONS ON THIS PAGE SHOULD BE ANSWERED BY EVERYONE

37. Are you familiar with the activities of the Georgia Ridesharing Program?

28-1 ☐ Yes
-2 ☐ No (SKIP TO QUESTION 40)

38. Have you received any of the following from the Georgia Ridesharing Program? (Answer yes or no for each item)

	Yes	No	
30	30-1 ☐	-2 ☐	Brochures on carpooling or vanpooling
31	31-1 ☐	-2 ☐	MARTA route and schedule information
32	32-1 ☐	-2 ☐	List of people with whom I could carpool or vanpool
33	33-1 ☐	-2 ☐	Assistance in forming or joining a carpool or vanpool
34	34-1 ☐	-2 ☐	Other (specify)_____

35 ☐

39. If you received any of the above, how did you use it? (Check as many as apply)

37-1 ☐ This information helped me start carpooling or vanpooling
38-1 ☐ This information helped me find replacement or additional members for my carpool or vanpool
39-1 ☐ I contacted people on the list but did not start carpooling or vanpooling with any of them
Why not? _____
_____

42 ☐

40-1 ☐ I filed this information away for future use
41-1 ☐ I did not use this information
Why not? _____
_____

44 ☐

40. What is your occupation? (Check one)

46-1 ☐ Salesperson
-2 ☐ Clerical/office worker
-3 ☐ Shop/production worker
-4 ☐ Craftsman or foreman
46-5 ☐ Service worker
-6 ☐ Professional/technical
-7 ☐ Manager/administrator
-8 ☐ Transportation/driver
-9 ☐ Other (specify) _____

47 ☐

41. During the past 12 months, how many days did you not go to your usual place of work for each of the following reasons (excluding holidays)?

Illness 49 ___ days
Vacation 51 ___ days
Personal leave 53 ___ days
Out-of-town business 55 ___ days

42. Are you... 57-1 ☐ Male 57-2 ☐ Female

43. What is your age? 58 ___ years

44. To which of the following ethnic groups do you belong? (Check one)

60-1 ☐ White
-2 ☐ Black
60-3 ☐ Spanish-surnamed
-4 ☐ Other (specify) _____

61 ☐

45. How many people live in your household including yourself? 62 ___

46. Including yourself, how many people in your household are...(ANSWER BOTH PARTS)

Employed full-time or part-time? 64 ___
Licensed to drive? 66 ___

47. In what range is your annual household income? (Check one)

68-1 ☐ Less than $5,000
-2 ☐ $5,000 - $9,999.
-3 ☐ $10,000 - $14,999
-4 ☐ $15,000 - $19,999
-5 ☐ $20,000 - $24,999
68-6 ☐ $25,000 - $34,999
-7 ☐ $35,000 - $44,999
-8 ☐ $45,000 - $54,999
-9 ☐ $55,000 - $74,999
-0 ☐ $75,000 and over

48. Please indicate today's date _____, 1982

69 ☐

EMPLOYEE SURVEY: SHORT FORM

This travel survey will be used by local transportation agencies to improve travel conditions in the Atlanta area. Please answer the following question as accurately as possible. Your response will be strictly confidential.

How do you most often commute to and from work? (Check all that apply if you usually use a combination of means to make a one-way trip)

1. ☐ Drive alone
2. ☐ Drive or ride with one or more other people
3. ☐ MARTA express bus
4. ☐ MARTA local bus
5. ☐ MARTA rail
6. ☐ Private or employer-sponsored bus
7. ☐ Taxi
8. ☐ Motorcycle or bicycle
9. ☐ Walk
10. ☐ Other (specify) _____

APPENDIX C

DATA ANALYSIS AND WEIGHTING METHODOLOGY

Each employer and employee response was weighted to correct for the effects of stratification and differential response rates among population segments.

Employer Weights

The employer population at each site was stratified into four segments by firm size: 1-19 employees, 20-99 employees, 100-499 employees, and 500 or more employees. Each population segment was sampled at a different rate, the sampling rate increasing with firm size. Thus, four values for non-normalized employer weights, FVWGT, were calculated, one for each firm size category.

$$\text{FVWGT} = \frac{\text{\# of firms in site SMSA in firm's size category}}{\text{\# of firms sampled in firm's size category}}$$

$$\times \frac{\text{\# of firms sampled in firm's size category}}{\text{\# of surveys returned in firm's size category}}$$

$$= \frac{\text{\# of firms in site SMSA in firm's size category}}{\text{\# of surveys returned in firm's size category}}$$

The weights, FVWGT, were then normalized. This normalized set of weights, ERWGT, was applied to the employer survey responses in the analysis.

$$\text{ERWGT} = \frac{\text{total number of surveys returned}}{\text{total number of firms in the site SMSA}} \times \text{FVWGT}$$

Employee Weights

The employee population was weighted to take into account three factors: (1) differential sampling and response rates of employers of different sizes, who were responsible for distributing the employee surveys to their own employees; (2) differential sampling rates of employees at different sized firms and differential employee response rates; and (3) potentially different employee response rates for those who rideshared and those who did not due to the focus of the survey on ridesharing and the large number of questions asked only of ridesharers.

FVWGT was used to take into account the first factor. FVWGT's use assumes that all those, and only those, employers who responded to the employer survey distributed forms to their employees, a fairly accurate assumption. To take the second factor into account the weight EMPSAMP was used.

$$\text{EMPSAMP} = \frac{\text{\# of employees in firm}}{\text{\# of employees receiving surveys}}$$

$$\times \frac{\text{\# of employees receiving surveys}}{\text{\# of surveys returned in firm}}$$

$$= \frac{\text{\# of employees in firm}}{\text{\# of surveys returned in firm}}$$

To develop weights which corrected for the third factor, it was necessary to examine potential non-response bias based on whether an employee rideshared. Employers who distributed the employee surveys (the "long" forms) were requested to give out to a different sample of employees "short" survey forms which asked only whether an employee's present primary mode was ridesharing. Weights for ridesharers were adjusted using FVXWGT.

$$\text{FVXWGT} = \frac{\text{\% ridesharing in firm based on long and short form responses}}{\text{\% ridesharing in firm based on long form only responses}}$$

Adjustments to non-ridesharers' weights were made using FVYWGT.

$$\text{FVYWGT} = \frac{\text{\% not ridesharing in firm based on long and short form responses}}{\text{\% not ridesharing in firm based on long form only responses}}$$

Specifically, then:

$$\text{FVXWGT} = \frac{\text{\# of long and short form rideshare respondents in firm}}{\text{\# of long and short form respondents in firm}}$$

$$\div \frac{\text{\# of long form rideshare respondents in firm}}{\text{\# of long form respondents in firm}}$$

$$FVYWGT = \frac{\text{\# of long and short form non-rideshare respondents in firm}}{\text{\# of long and short form respondents in firm}} \div \frac{\text{\# of long form non-rideshare respondents in firm}}{\text{\# of long form respondents in firm}}$$

Generally, the bias was small, and FVXWGT and FVYWGT were close to one.

A non-normalized set of employee weights was calculated both for ridesharing and non-ridesharing respondents. For ridesharers:

$$RSHRWGT = FVWGT * EMPSAMP * FVXWGT$$

For non-ridesharers:

$$NRSHRWGT = FVWGT * EMPSAMP * FVXWGT$$

Combining the two sets of weights:

INDWGT = RSHRWGT for ridesharers
NRSHRWGT for non-ridesharers

A small percentage of the INDWGT's were felt to be excessively large. These large weights generally were caused by a low employee response rate (large EMPSAMP) in a small firm (large FVWGT). To reduce the large influence of these weights, all weights above approximately the 98th percentile weight were reduced in size to that of the 98th percentile weight (the weight reduction breakpoint varied slightly from site to site depending on the relative magnitude of the largest weights). It was thought that the potential bias from giving a large influence to a small number of employees whose response rate was low was more harmful than adjusting the theoretically correct weights.

A set of normalized weights, EEWGT, was used in the analysis, where:

$$EEWGT = \frac{\text{total number of surveys returned}}{\text{weighted number of employees obtained by applying the truncated INDWGT's*}} \times INDWGT$$

*Note that weighted number of employees obtained by applying the INDWGT's before truncation = total number of employees at firms in the site SMSA.

REFERENCES

1. "National Ridesharing Demonstration Program Evaluation Plan," memorandum, U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, January 1980.

2. R. H. Ribner, "Ridesharing Operations," Special Research Report 193, Transportation Research Board, National Academy of Sciences, Washington, DC, 1981.

3. F. A. Wagner, Evaluation of Carpool Demonstration Projects; Phase I Report, U. S. Dept. of Transportation, Federal Highway Administration, Washington, DC, October 1978.

4. "Labor Letter," Wall Street Journal, October 11, 1983.

5. P. N. Fulton, "Are We Solving the Commuting Problem?," American Demographics, November 1983.

6. Fleishman, D., M. Flusberg, and J. Attanucci, Paratransit for the Work Trip: Commuter Ridesharing, DOT-I-82-16, U. S. Dept. of Transportation, Urban Mass Transportation Administration, Washington, DC, August 1982.

7. C. Shallbetter, "Ridesharing: Private and Public Roles and Responsibilities," Special Research Report 193, Transportation Research Board, National Academy of Sciences, Washington, DC, 1981.

8. Ridesharing: Meeting the Challenges of the '80s; The Report of the National Task Force on Ridesharing, U. S. Dept. of Transportation, Federal Highway Administration, Washington, DC, n. d.

9. E. F. Kearney et. al., Legal Impediments to Forming Carpools, Vanpools and Other Types of Ridesharing Arrangements, U. S. Dept. of Transportation, Federal Highway Administration, Washington, DC, 1979.

10. A. Altshuler, "Keynote Address: The Ridesharing Challenge," Special Research Report 193, Transportation Research Board, National Academy of Sciences, Washington, DC, 1981.

11. Bonsall, P. W., A. H. Spencer, and W-S Tang, "What Makes A Car Sharer? A Motivational Investigation," Working Paper 158, University of Leeds (England) Institute for Transport Studies, March 1982.

12. Weisbrod, G. and E. Eder, Evaluation of the Minneapolis Ridesharing Commuter Services Demonstration; Final Report, U. S. Dept. of Transportation, Washington, DC, June 1980.

13. Wiley-Jones, R., K. Nichols, and R. C. Monroe et al., Wisconsin Rideshare; 1982 Public Opinion Survey of Ridesharing; Summary Report, Wisconsin Dept. of Transportation, Milwaukee, WI, May 1983.

14. Brunso, J. M. and D. T. Hartgen, "Can Employer-Based Carpool Coordinators Increase Ridesharing?," Transportation Research Record 823, Transportation Research Board, National Academy of Sciences, Washington, DC, 1981.

15. Kulp, G., H. J. Tsao and R. E. Webber, An Evaluation of Ridesharing Programs in Michigan, ORNL/CON-99, Oak Ridge National Laboratory, Oak Ridge, TN, October 1982.

16. Heaton, C., et al., Impacts and Effectiveness of Third-Party Vanpooling; A Synthesis and Comparison of Findings from Four Demonstration Projects, U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, March 1983.

17. Curry, D. and A. Martin, "City of Los Angeles Parking Management Ordinance," paper prepared for presentation at the 64th Annual Meeting of the Transportation Research Board, Washington, DC, January 1985.

18. Pickrell, D.H. and D.C. Shoup, "Employer-Subsidized Parking and Work-Trip Mode Choice," Transportation Research Record 786, Transportation Research Board, National Academy of Sciences, Washington, DC, 1980.

BIBLIOGRAPHY

NRDP Evaluation Documents

Project Documents

Booth, R., "The National Ridesharing Demonstration Program; Work Plan for Analysis," U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, August 1983.

Doxsey, L., "Weighting of Data from National Ridesharing Program Projects," technical memorandum, November 23, 1982.

"National Ridesharing Demonstration Program Evaluation Plan," U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, January 1980.

Individual Reports

ATLANTA: Krechmer, D., "Atlanta Ridesharing Demonstration Evaluation," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Charles River Associates, Boston, MA, April 1984.

*BOSTON: Ziering, E., "Status Report and Institutional History of the Masspool Ridesharing Demonstration," summary memo prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Charles River Associates, Inc., Boston, MA, 28 June 1982.

*CHICAGO: Shearin, G., "Analysis of Delays in the Chicago Ridesharing Demonstration Project," summary memo prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Crain & Associates, Inc., Los Altos, CA, 16 July 1982.

CINCINNATI: Shearin, G., "Cincinnati Ridesharing Demonstration Project," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Crain & Associates, Inc., Los Altos, CA, December 1983.

*DENVER: Shearin, G., "Summary of the Denver Ridesharing Project," summary memo prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Crain & Associates, Los Altos, CA, 30 September 1983.

*DETROIT: Shearin, G., "Analysis of Delays in the Detroit Ridesharing Demonstration Project," summary memo prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Crain & Associates, Los Altos, CA, 12 July 1982.

*Internal memo only, not for circulation or distribution.

HOUSTON: Harrison, F. and R. Lung, "Evaluation of the Houston Ridesharing Demonstration Project," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Cambridge Systematics, Inc., Cambridge, MA, May 1983.

*JACKSON: Rubin, D., "Jackson Ridesharing Evaluation Termination Memo," summary memo prepared for U. S. Dept. of Transportation, Transportation Systems Center by COMSIS Corporation, Wheaton, MD, July 1982.

LINCOLN: Sindzinski, J., "Lincoln Home End Ridesharing Demonstration Project," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Crain & Associates, Inc., Los Altos, CA, May 1984.

*LOUISVILLE: Shearin, G., "Analysis of Delays in the Louisville Ridesharing Demonstration Project," summary memo prepared for U. S. Dept. of Transporation, Transportation Systems Center, by Crain & Associates, Los Altos, CA, 9 July 1982.

NORTH CAROLINA: Rubin, D., "North Carolina Ridesharing Demonstration," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by COMSIS Corporation, Wheaton, MD, May 1984.

*PHILADELPHIA: Levinsohn, D., "Philadelphia Ridesharing Evaluation Termination Memo," summary memo prepared for U. S. Dept. of Transportation, Transportation Systems Center, by COMSIS Corporation, Wheaton, MD, November 1982.

PORTLAND: Gelb, P. M. and R. M. Donnelly, "National Ridesharing Demonstration Program: Portland, Oregon Case Study," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by De Leuw, Cather & Company, San Francisco, CA, January 1984.

*SAN ANTONIO: Suhrbier, J. and F. D. Harrison, "The San Antonio National Ridesharing Demonstration Project--Status and Prospects," summary memo prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Cambridge Systematics, Inc., Cambridge, MA, 14 October 1982.

SEATTLE: Gelb, P. M. and R. M. Donnelly, "National Ridesharing Demonstration Program: Seattle, Washington Case Study," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by De Leuw, Cather & Company, San Francisco, CA, January 1984.

SOUTHERN CALIFORNIA: Hakanson, J. P., "Southern California Project: The In-House Ridesharing Coordinator," report prepared for Southern California Association of Governments, by Commuter Transportation Services, Inc., Los Angeles, CA, March 1983.

TIDEWATER: Kuzmyak, J. R., "Shared-Ride Taxi Demonstration; Tidewater, Virginia," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by COMSIS Corporation, Wheaton, MD, December 1984.

Selected Works on Ridesharing

Bonsall, P. W., A. H. Spencer, and W-S Tang, "What Makes a Car Sharer? A Motivational Investigation," Working Paper 158, The University of Leeds (England) Institute for Transport Studies, March 1982.

Brunso, J.M. and D.T. Hartgen, "Can Employer-Based Carpool Coordinators Increase Ridesharing?," Transportation Research Record 823, Transportation Research Board, National Academy of Sciences, Washington, DC, 1981.

Copeland, T., Economic Feasibility of Independent Vanpool Operations, Federal Energy Administration, Washington, DC, September 1976.

Curry, D. and A. Martin, "City of Los Angeles Parking Management Ordinance," paper prepared for presentation at the 64th Annual Meeting of the Transportation Research Board, Washington, DC, January 1985.

Fleishman, D., M. Flusberg, and J. Attanucci, Paratransit for the Work Trip: Commuter Ridesharing, DOT-I-82-16, U. S. Dept. of Transportation, Urban Mass Transportation Administration, Washington, DC, August 1982.

Fulton, P. N., "Are We Solving the Commuting Problem?," American Demographics, November 1983.

Hartgen, D. T., and J. Brunso, Statistical Controls in Ridesharing Demonstrations, New York State Department of Transportation, Albany, NY, Transportation Analysis Report 11, May 1982.

Heaton, C. et al., Impacts and Effectiveness of Third-Party Vanpooling; A Synthesis and Comparison of Findings from Four Demonstration Projects, U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, March 1983.

Jacobson, J. O., "Employer Vanpool Programs: Factors in Their Success or Failure," University of Washington, Seattle, WA, June 1977.

Jacobson, J., "Selectivity Bias in the Response to a Transportation Assistance Project," U. S. Dept. of Transportation, Transportation Systems Center, January 1982.

Johnson, C. et al., Ride Sharing and Park and Ride: An Assessment of Past Experience and Planning for the Future, 4 Vols., U. S. Dept. of Transportation, Research and Special Programs Administration, Washington, DC, November 1977.

Kearney, E. F. et al., Legal Impediments to Forming Carpools, Vanpools and Other Types of Ridesharing Arrangements, U. S. Dept. of Transportation, Federal Highway Administration, Washington, DC, 1979.

_____, "Legal Impediments to Ridesharing Arrangements -- An Update," U. S. Dept. of Transportation, Federal Highway Administration, Washington, DC, 1981.

Kocur, G., "A Model to Assess Cost and Fuel Savings from RideSharing," Transportation Research Bulletin, Vol. 17B, No. 4, 1983.

Kostyniuk, L. P., "State-of-the-Art Review of Demand Analysis for Ridesharing," U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, July 1980.

Kulp, G., H. J. Tsao, and R. E. Webber, An Evaluation of Ridesharing Programs in Michigan, ORNL/CON-99, Oak Ridge National Laboratory, Oak Ridge, TN, October 1982.

"Labor Letter," Wall Street Journal, 11 October 1983, p. 1.

McCall, C. H., Jr., COM-BUS: A Southern California Subscription Bus Service, U. S. Dept. of Transportation, Transportation Systems Center, May 1977.

McClelland, L., M. B. Marks, M. Edison et al., "Evaluating Employer Programs Encouraging the Use of Alternate Transportation Modes: Two Studies," Transportation, 10, 1981.

Model State Law to Remove Legal Impediments to Ridesharing Arrangements, U. S. Dept. of Transportation, Federal Highway Administration, Arlington, VA, 4 September 1979.

Model State Ridesharing Incentives Law, U. S. Dept. of Transportation, Federal Highway Administration, Arlington, VA, 21 June 1982.

Perin, C., "Implications of Selected Societal Trends for Urban Transportation Policy and Research," Staff Study No. SS-24-U.3-194, U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, January 1981.

Pickrell, D.H. and D.C. Shoup, "Employer-Subsidized Parking and Work-Trip Mode Choice," Transportation Research Record 786, Transportation Research Board, National Academy of Sciences, Washington, DC, 1980.

Ridesharing: Meeting the Challenges of the '80s; the Report of the National Task Force on Ridesharing, U. S. Dept. of Transportation, Federal Highway Administration, Washington, DC, n.d.

Schueftan, O., and D. Wagner, "Employer Involvement in Employee Transportation," report prepared for U. S. Dept. of Transportation, Transportation Systems Center, by Peat, Marwick, Mitchell & Co., Washington, DC, June 1984.

Shallbetter, C., "Ridesharing: Private and Public Roles and Responsibilities," Special Research Report 193, Transportation Research Board, National Academy of Sciences, Washington, DC, 1981.

Smith, S. A. and S. J. TenHoor, "Model Parking Code Provisions to Encourage Ridesharing and Transit Use--A Review of Experience," U. S. Dept. of Transportation, Federal Highway Administration, Washington, DC, April 1983.

Transportation Research Board, National Academy of Sciences, Current Status of Ridesharing Activities, Transportation Research Record 823, Washington, DC, 1981.

Transportation Research Board, National Academy of Sciences, Ridesharing Needs and Requirements: The Role of the Private and Public Sectors, Special Research Report 193, Washington, DC, 1981.

U.S. Bureau of the Census, Census of Population: 1970, Volume I, "Characteristics of the Population," Part I, U. S. Summary, Section 1, U. S. Department of Commerce, Washington, DC, 1971.

_____, Current Population Reports P-23, #99, "Journey to Work in the U.S.: 1975," U. S. Department of Commerce, Washington, DC, July 1979.

_____, Statistical Abstract of the United States; 1982-83, Washington, DC: U. S. Department of Commerce, Washington, DC, 1982.

Wagner, F. A., Evaluation of Carpool Demonstration Projects; Phase I Report, U. S. Dept. of Transportation, Washington, DC, October 1978.

Weber, N., "Transporting Employees: The New Corporate Programs," The Conference Board, Research Bulletin 131, Washington, DC, 1983.

Weisbrod, G. and E. Eder, Evaluation of the Minneapolis Ridesharing Commuter Services Demonstration; Final Report, U. S. Dept. of Transportation, Transportation Systems Center, Cambridge, MA, June 1980.

Wiley-Jones, R., K. Nichols, and R. C. Monroe et al., Wisconsin Rideshare; 1982 Public Opinion Survey of Ridesharing; Summary Report, Wisconsin Dept. of Transportation, Milwaukee, WI, May 1983.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1985--502-257--20114

500 copies

HE 18.5 .A3
MTA- 85-17
Booth. Rose

National ri
demonstrat

Form DOT F 1720
FORMERLY FORM DO

DOT LIBRARY
00353137